45th Annual Targets, UAVs & Range Operations Symposium & Exhibition
"Tools and Technologies for The Warfighter"
San Diego, CA

29 – 31 October 2007

Agenda

Tuesday, October 30, 2007

Keynote Speaker:
Brigadier General David J. Eichhorn, USAF, Director of Air, Space and Information Operations, Headquarters, Air Force Material Command, Wright-Patterson Air Force Base, Ohio

- ***Joint Close Air Support Enabled by Future Airborne Networking*** wmv format

Session I: ***Ranges and Range Operations***

- Common Range Integrated Instrumentation System (CRIIS), ***Mr. Magdy "Mike" Sorial,*** CRIIS Program Director, 29ARSG/EN, Eglin AFB
- Real Time Trajectory Planning for Targets via Heuristics Search, ***Mr. Luis E. Alvarado, Sr.,*** Systems Control Engineer
- Target Operational and Engineering Support ***Mr. Thomas Dowd, Director,*** Threat/Target Systems Department, Pt. Mugu, CA
- DOT&E Targets Overview, ***Mr. Joshua Messner,*** DOT&E Target Resources, OSD
- JSF Range and Airspace Requirements, ***Major "Digger" Davis,*** HQ ACC/A8F
    1. ***Targets*** QuickTime format

Session II: ***New Technology***

- Low Cost Alternative Target, ***Mr. Larry Berger,*** Chief Engineer, MDSI
    1. ***GT-400 Flight Test*** wmv format
- Joint Ground Robotics Program, ***Mr. Duane Gotvald,*** Deputy Project Manager, PEO GCS Robotic Systems Joint Program
    1. ***QuickTime Video Clip***

Hugh Harris Scholarship Update

Wednesday, October 31, 2007

Session III: ***Current Trends***

- GPS-Based Target Control Software Innovations, ***Mr. Dennis Brooks,*** Project Director, Target Control Systems, US Army TMO, Huntsville, Alabama
- DTRMC, OSD Strategic Plan, ***Mr. Jerry Christensen,*** DOT&E

Session IV: ***Military Programs and Requirements***

- Navy, *Captain Pat Buckley,* USN, PMA-208
    1. *Sales Aren't Up* wmv format
- Air Force, *Michele Brazel,* Squadron Director, 691st Armament Systems Squadron, Eglin AFB, Florida
    1. *691 ARSS* wmv format
- Overview Of U.S. Army, PEO STRI, PM ITTS TMO Activities, ***Mr. Al Brown,*** TMO Deputy Director, PMITTS, PEO STRI
    1. ***Targets Management Office*** wmv format

National Defense Industrial Association

NATIONAL DEFENSE INDUSTRIAL ASSOCIATION
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45th Annual Targets, UAV & Range Division Symposium

David Miller
Meggitt Defense Systems
NDIA Target, UAV & Range Ops Division

David Laird
Micros Systems, Inc
Symposium Chair

Session Chairs
Joshua Messner
Craig Tangedal
John Vanbrabant
Charles Farrior
Bob Palmer

THANKS!

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and

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Major Joseph P. Hylan, USMC (Ret)

45th Annual Targets, UAV & Range Division Symposium

Sympsosium Chair:

Mr. David Laird

Micro Systems, Inc.

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

8:00 AM *Welcome Remarks*
David Laird, Micro Systems, Inc.
Symposium Chair

8:15 AM *Keynote Presentation*
Brigadier General David J. Eichhorn, USAF
Dir, Air, Space and Information Operations
HQ, AFMC

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

Session I - Ranges & Range Operations

Chair: Dennis Mischel

DOT&E Targets

9:00 AM *Session Introduction*

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

9:15 AM	***Common Range Integrated Instrumentation System*** **Magdy "Mike" Sorial, CRIIS Program Director**
9:40 AM	***Real Time Trajectory Planning for Targets via Heuristics Approach*** **Manuel Soto, White Sands Missile Range**
10:00AM	***Break – Exhibits Open for Viewing***

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

10:45AM *Target Operational & Engineering Support*
Thomas Dowd, Dir, Threat Target Systems, Pt Mugu

11:05AM *JSF: Targets & Ranges Test & Training Requirements*
Col Russell Handy, Commander, 33d Fighter Wing

11:50AM *Improvements & Upgrades at the Sea Range*
Karen Draper, Sea Range Test Mgmt Br, Pt Mugu

12:10AM *Willis Howard Award Presentation*
David Miller, Meggitt Defense Systems
NDIA Division Chair

45th Annual Targets, UAV & Range Division Symposium

12:25 – 1:45 ***Lunch – Exhibit Hall***

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

Session II – New Technology

Chair: Craig Tangedal

1:45 PM ***Session Introduction***

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

2:05PM *Improvised Explosive Devices*

Captain Jeffrey Timbore, USN, JIEDDO

2:25PM *Hammerhead, NATO Qualified Sea Surface Target System*

Spencer Fraser, MDS Canada

2:45PM *Break – Exhibit Hall*

45th Annual Targets, UAV & Range Division Symposium

Tuesday, October 30, 2007

3:20PM *GT-400 Low Cost Alternative Target*
Larry Berger, Chief Engineer, MDSI

3:40PM *Joint Ground Robotics Program*
Duane Gotvald, Dep Proj Mgr, PEO GCS Robotic Systems Joint Program Office

4:00PM *Hugh Harris Scholarship Update*
Mr. Cort Proctor, Micro Systems, Inc

4:30PM-6:00PM *Reception in Exhibit Hall*

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

8:00AM *Welcome and Keynote Introduction*

David Laird, Micro Systems, Inc, Symposium Chair

8:15AM *Keynote*

Mr. John Salafia, Director, Target Programs, Unmanned Systems, Northrop Grumman Integrated Systems

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

Session III – Current Trends

Chair: JohnVanBrabant

Northrop Grumman Corporation

9:00AM *Session Introduction*

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

9:15AM *GPS-Based Target Control Software Innovations*

Dennis Brooks, Proj Dir, Tgt Control Sys, US Army TMO

9:35AM *Break in Exhibit Hall*

10:00AM *General Session Resumes*

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

10:00AM	***Super Sonic Sea Skimming Target – A Lower Cost Alternative*, LCDR E. Ferguson, RCN, NDHQ**
10:20AM	***DTRMC, OSD Strategic Plan*** **Jerry Christensen, DOT&E**
10:40	***Target Management Initiative*** **Ken McCormick, DOT&E**
11:10AM	***Surface Target Laser Aim Scoring System*** **Rob Couture, Program Dir, Meggitt Defense Systems**
11:30AM	***DAU: Contingency Contracting*** **Joel Brown, DAU, San Diego**
11:50	***Lunch* – Exhibit Hall**

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

Session IV – Military Programs & Requirements

Chair: Charles Farrior

Army TMO

1:30pm ***Session Introduction***

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

1:45PM *Army*

Mr. Steve Milburn, TMO, Huntsville

2:15PM *Navy*

Captain Pat Buckley, USN, PMA-208

2:45PM *Air Force*

Michele Brazel, Sqdn Director, 691st Armt Sys Sqdn

45th Annual Targets, UAV & Range Division Symposium

Wednesday, October 31, 2007

3:15PM *Concluding Remarks*

David Laird, Symposium Chair

National Defense Industrial Association

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Targets Management Office

Purpose:

Provide NDIA Symposium An Overview Of U.S. Army, PEO STRI, PM ITTS TMO Activities

"Tools and Technologies for the Warfighter"

Briefed by: Mr. Al Brown
TMO Deputy Director, PMITTS, PEO STRI
256-842-6421 DSN: 788-6421
e-mail: alvin.brown@us.army.mil

False Impression Caveat

It should be explicitly noted that the U.S. Government makes no official commitment nor obligation to provide any additional detailed information or agreement of sale on any of the systems/capabilities portrayed during this presentation that have not been authorized for release.

Video

OUTLINE

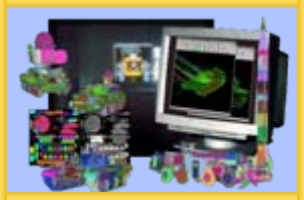
- **Mission**
- **Activities**
- **Customer Base**
- **Organization (Tie-in with Testing & Training)**
- **Recently Developed Products**
- **Future Efforts**
- **Summary**

TMO MISSION

MANAGE THE LIFE CYCLE ACQUISITION OF TECHNICALLY OPTIMIZED, INTEROPERABLE AND ADAPTABLE TARGETS, TARGET CONTROL SYSTEMS AND GROUND RANGE SYSTEMS USED IN THE LIVE AND VIRTUAL TESTING, TRAINING AND MISSION REHEARSAL ENVIRONMENTS, PROVIDING BEST VALUE PROCUREMENT, AND SUPERIOR LIFE CYCLE SUSTAINMENT AND OPERATION WHEN REQUIRED, FOR THE U.S. ARMY TRANSFORMATION, FUTURE FORCES, JOINT SERVICES, ALLIED CLIENTS AND GOVERNMENTAL AGENCIES

We respond to customer needs and institutional requirements

PRIMARY ACTIVITIES

Based on customer target requirements

- Aerial – Fixed and Rotary Wing
- Mobile Ground / Foreign Materiel
  - “Real Deal Steel”
  - Surrogates
- Virtual – Models and Simulations
- Precision Targetry Systems
- Auxiliary / Ancillary Equipment






Targets Management Office

WHAT WE DO

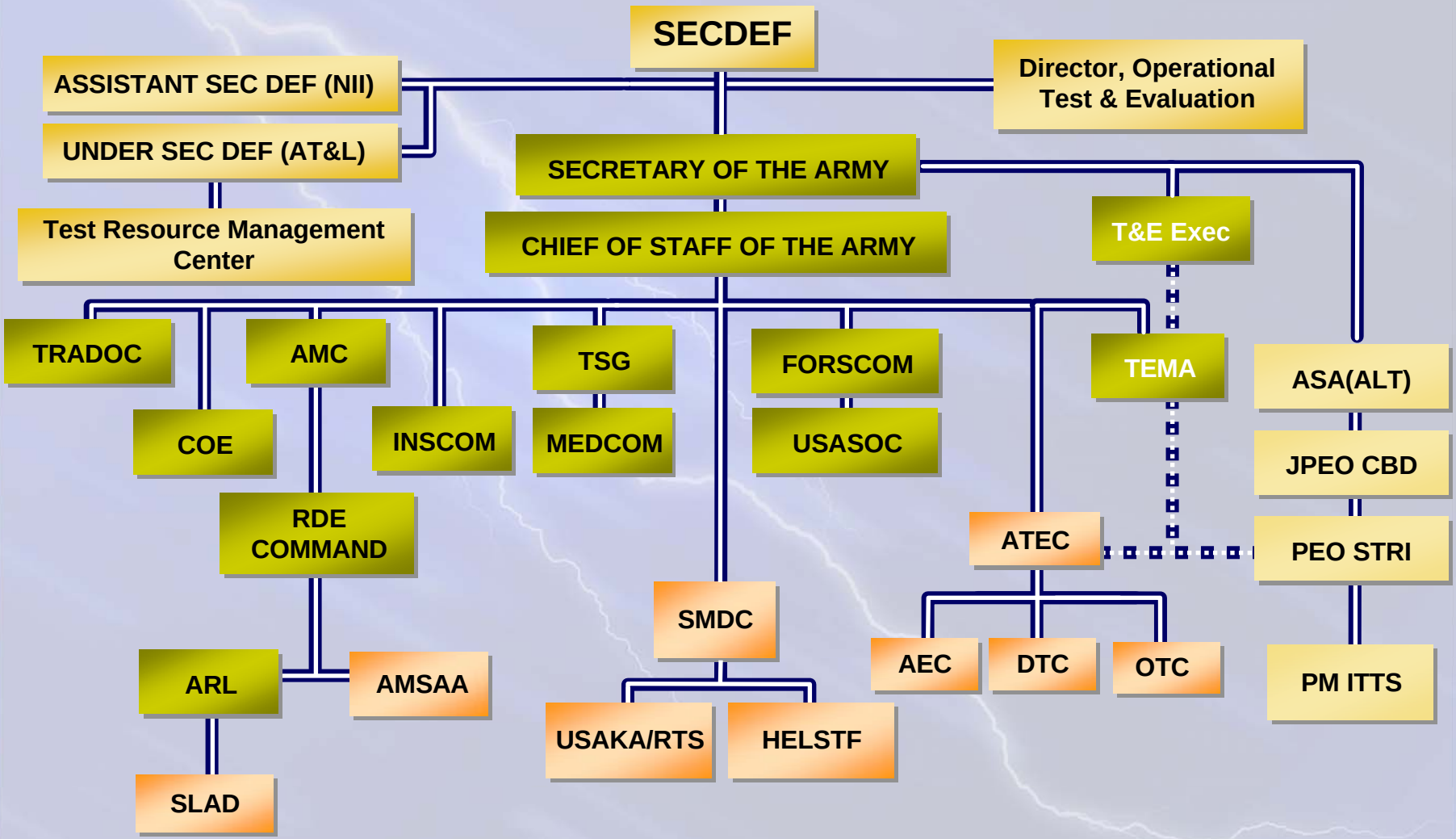
Develop products

Buy products

AND we

- Fly ’em
- Drive ‘em
- Fix ‘em

Army T&E Community



What we have developed recently

Low Cost Movers

Threat Vehicle
Surrogate Targets

Virtual Targets

UAS-Ts

JCHAAT

Things we plan to develop/purchase in the next five years

Precision Targets

RPVTs

Looking at technology areas to enhance current capabilities

Fully Mission Capable Threat Targets

Rotary Wing Targets

An Individual Product we plan to develop/purchase during the next five years

Precision Targets

Develop state-of-art signature technologies and applications for use on existing targetry or new targetry development efforts to support Army requirements.

Develop concepts that:

- Minimize cost
- Maximize signature fidelity – visual and thermal
- Minimize logistic requirements – reduce handling cost, easily transportable, easy to assemble, recyclable
- Maximize utility – adaptable to CCD&O technologies

An Individual Product we plan to develop/purchase during the next five years

Fully Mission Capable Threat Ground Targets

Acquire and field fully mission capable latest version, Foreign Threat Mobile Ground Targets (MTB, IFV, and APC) to meet emerging requirements for threat representative missions.

Capabilities will include:

Operational Turrets
Communications
Shoot-back capability
Operational Sights
Smoke (VEESS, launchers)
Ancilliary Equip

An Individual Product we plan to develop/purchase during the next five years

Remotely Piloted Vehicle Targets

Provide targets with ancillary devices and contractor support services for STRAC mandated live-fire crew gunnery weapon qualifications and missile engagement events.

Government Owned/Contractor Operated Aircraft.

An Individual Product we plan to develop/purchase during the next five years

Rotary Wing Targets

present realistic, threat representative, helicopter targets for use by Test and Evaluation and by Training groups worldwide.

SUMMARY

TMO:

- **ALWAYS LOOKING FOR BETTER, FASTER, CHEAPER PRODUCTS FOR OUR CUSTOMERS**
- **RECOGNIZED LEADER OF AERIAL AND GROUND TARGETS**
- **READY TO RESPONSIBLY SUPPORT T&E AND SPECIAL TRAINING REQUIREMENTS**

NEED INDUSTRY TO CONTINUE PROVIDING STATE OF THE ART TECHNOLOGIES FOR ADAPTATION AND INCORPORATION INTO TARGETRY

U.S. Navy Aerial Target Systems

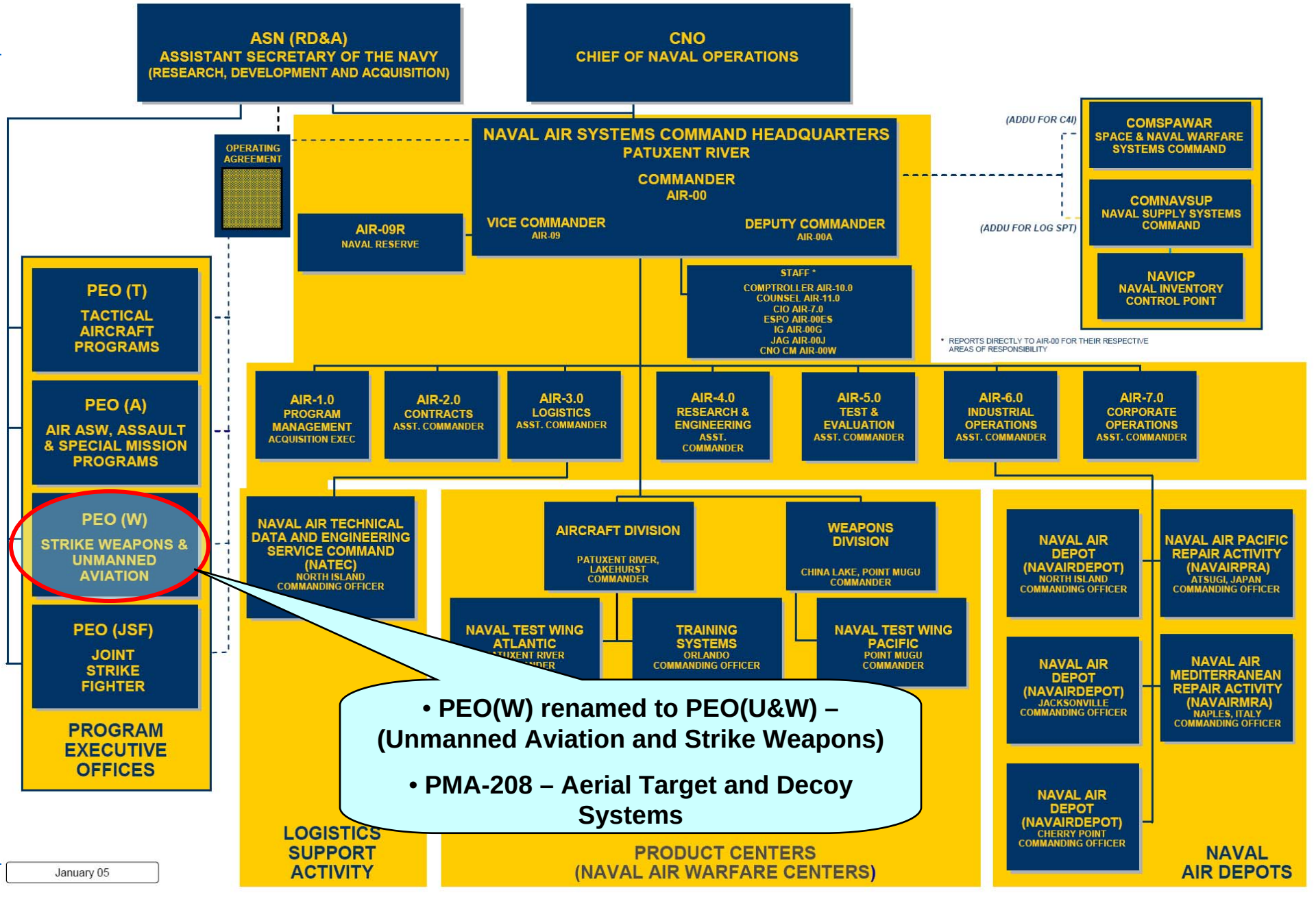
Presented to 45th Annual NDIA Symposium

Captain Pat Buckley
Program Manager
PMA-208, Aerial Target & Decoy Systems
31 October 2007

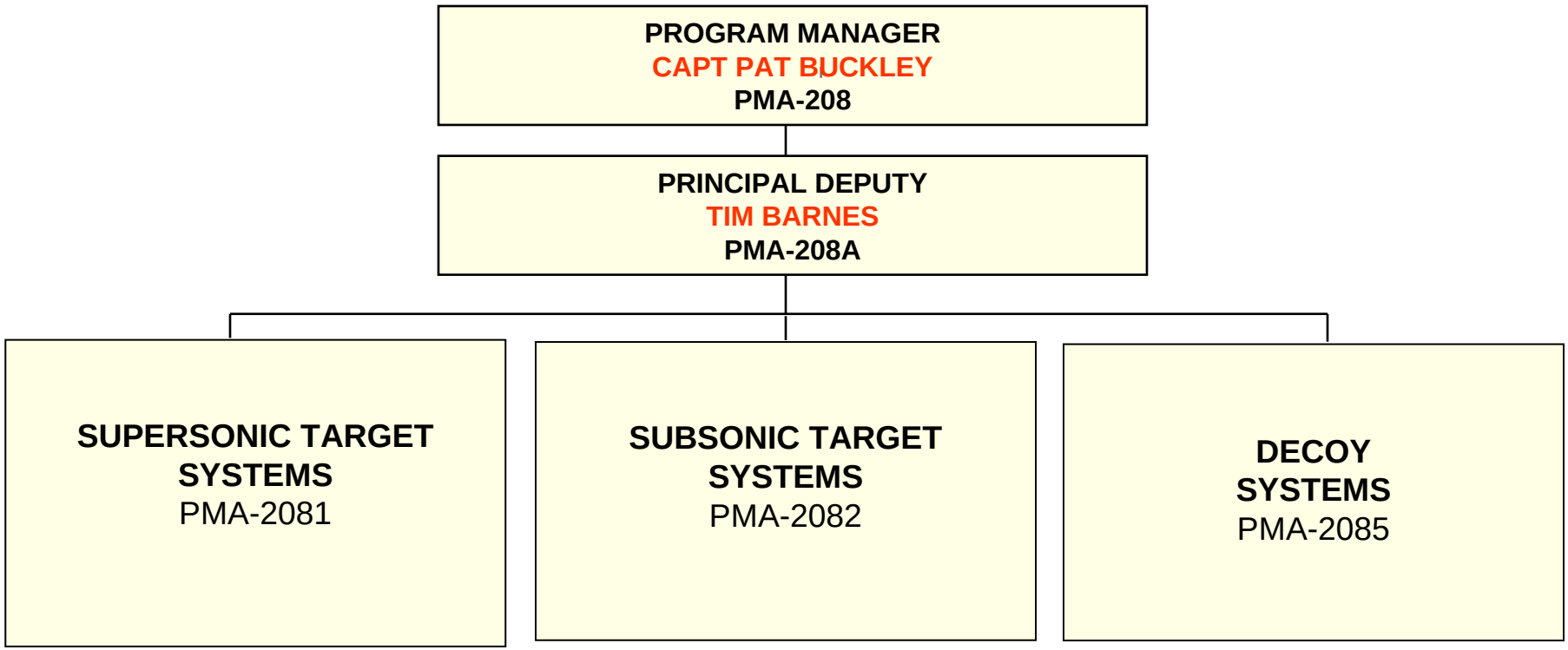
Outline

- Organization
- Product Line
- Operating Sites
- Supersonic Targets
- Subsonic Targets
- Full Scale Targets
- Target Control Systems
- Summary

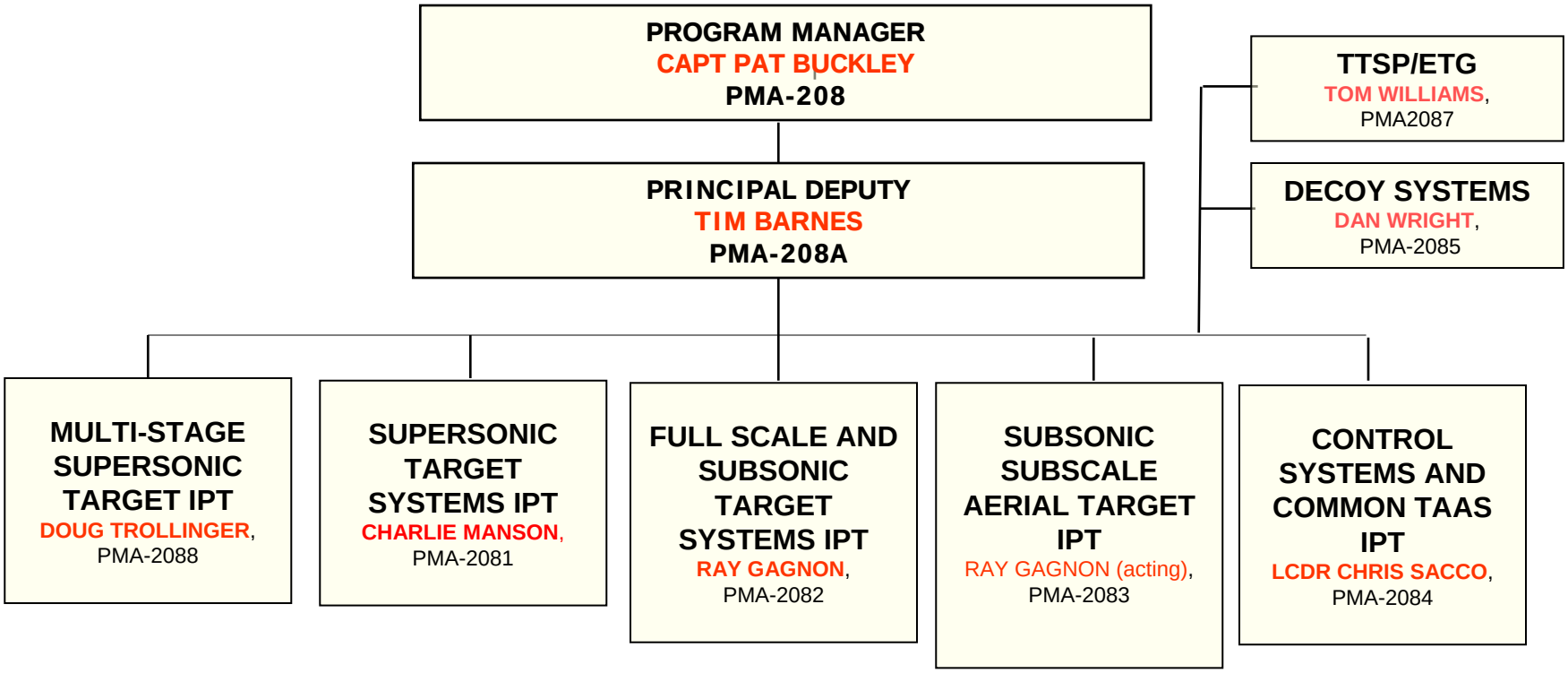
NAVAIR REPORTING RELATIONSHIPS



PMA-208
AERIAL TARGET & DECOY SYSTEMS
PROGRAM OFFICE 2006



PMA-208
AERIAL TARGET & DECOY SYSTEMS
PROGRAM OFFICE 2007



PMA-208 Product Line Fielded

Supersonic

GQM-163A

MA-31

AQM-37C

Full Scale & Subsonic

BQM-34S

BQM-74E

QF-4

Decoys

TALD

ITALD

Miscellaneous

QLT-1C

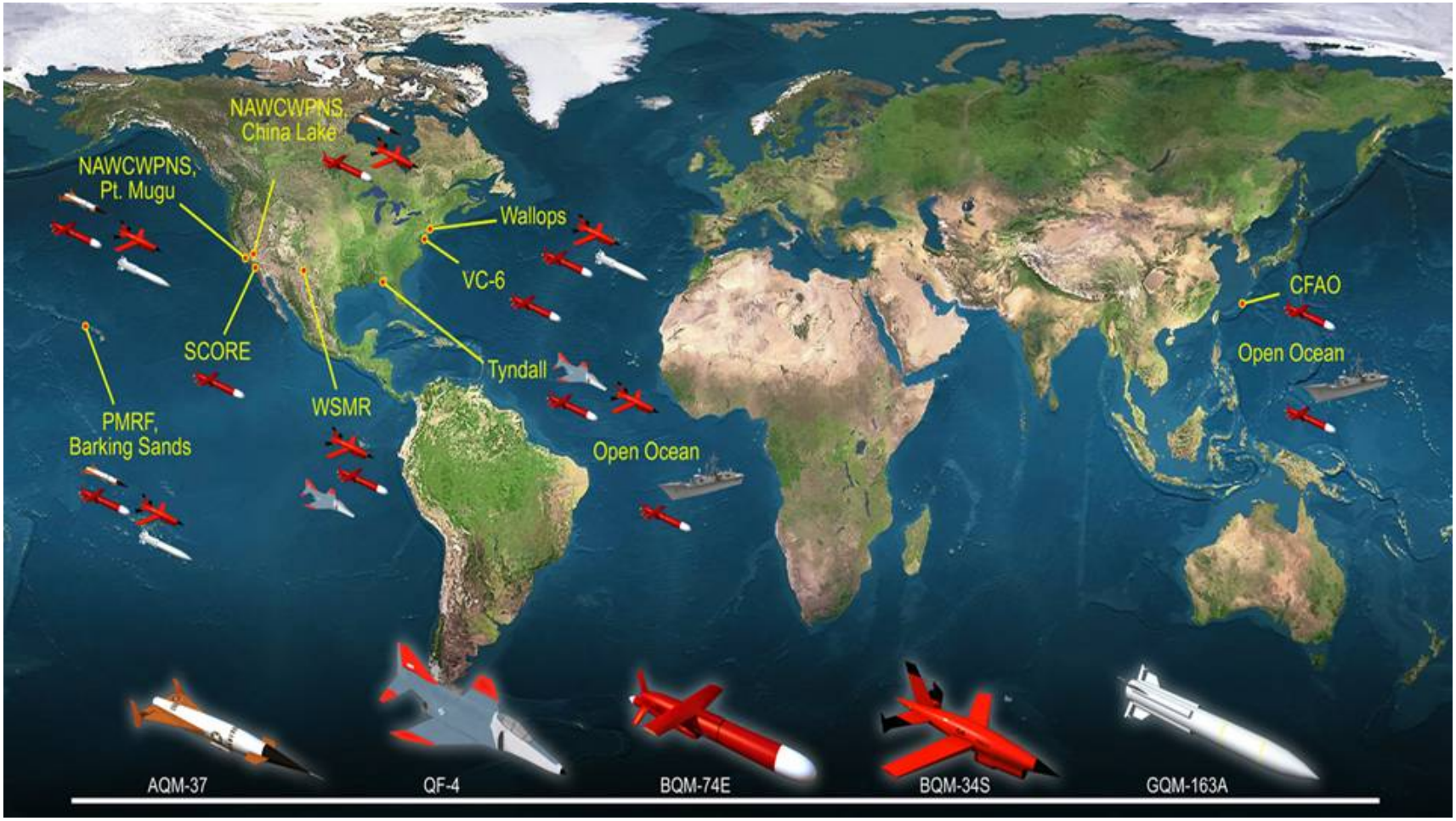
COMMON TA/AS

THREAT SIMULATION

TDU-32

SNTC

Operating Sites



- **VC-6 decommissioning in summer of 2008**
- **NAVAIR to conduct East Coast ops**

Supersonic Targets

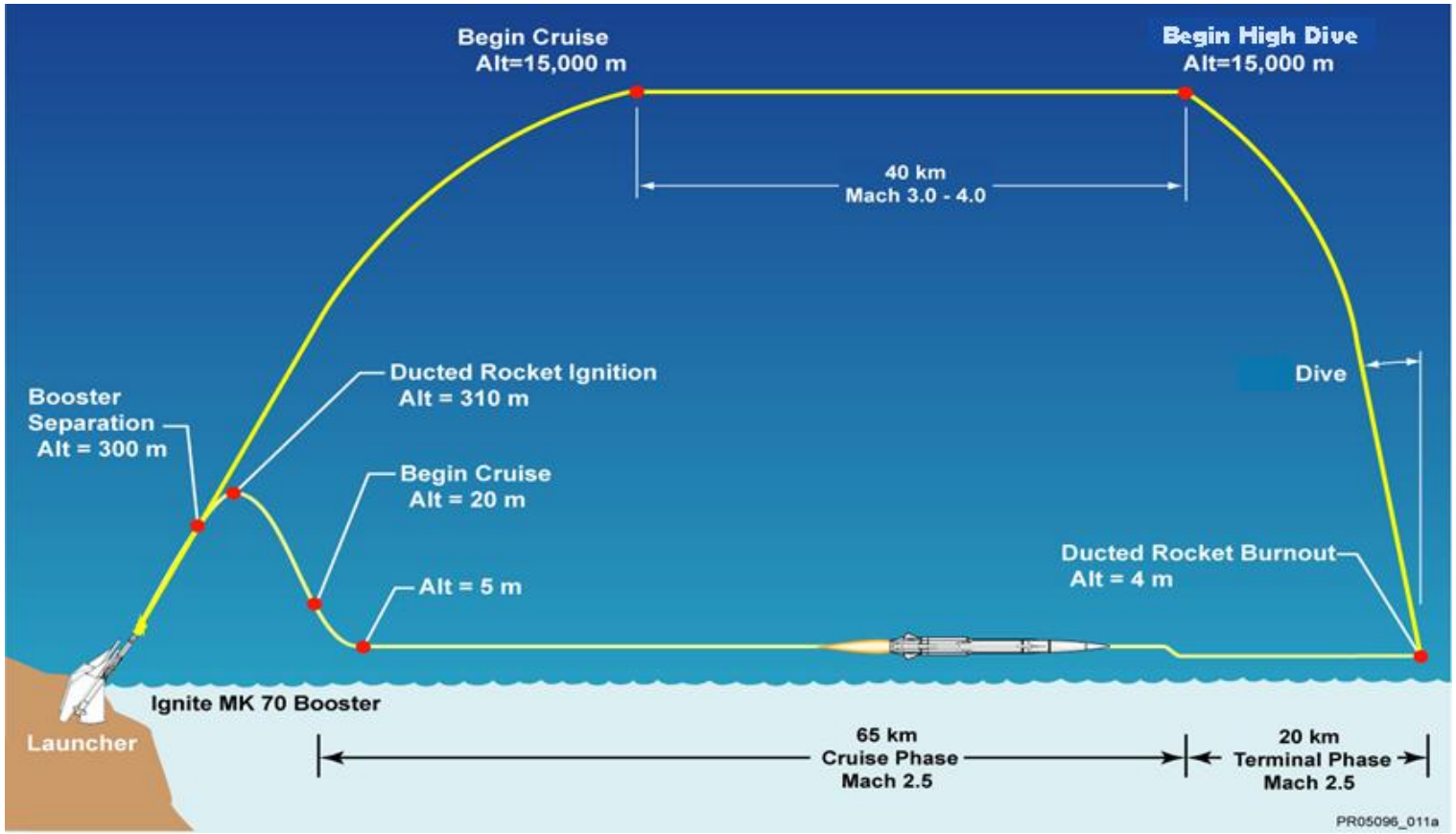
GQM-163A Supersonic Sea Skimming Target

GQM-163 Program Status

- Operations to date:
  - 6 October 2005; 12 June 2007; 13 June 2007
- FRP-2 contract awarded September 2007
- First Stream Raid OP planned for December 2007
- Plan to award FRP-III Second Quarter FY-08
- Prime Contractor: Orbital Sciences Corporation

GQM-163 Supports Threat A, B & C Requirements

GQM-163A
High Diver Initiative



- **High Diver development initiated in March 2006**
- **Demo expected in mid-2008**

MA-31

MA-31 Update

- Program initiated via Foreign Comparative Testing (FCT) & Expanded Demonstration Test (EDT) from 1995-2000

- USN contracted with Boeing for the delivery of MA-31 targets in FY2000
  - Executing plan to close out MA-31 procurement contract due to numerous setbacks beyond Navy/Boeing control

- Conducting Joint Navy (LPD-18) & Army (Patriot) operation in December 2007 at Pt. Mugu range with last remaining assets
  - Expecting final contract closeout after the operation

AQM-37

- **Medium to high altitude supersonic cruise with dive capability**
  - Mach 2.0 – 4.0
  - Range 100 mi
  - Altitude 1000 ft – 100 Kft
  - Demonstrated TBM profiles (300 Kft, 120 nmi downrange)
  - F-16 launch platform

- **Out of production system**
  - Last Delivery Dec 2001

- **Conduct approximately 10-15 operations per year (~ half FMS)**

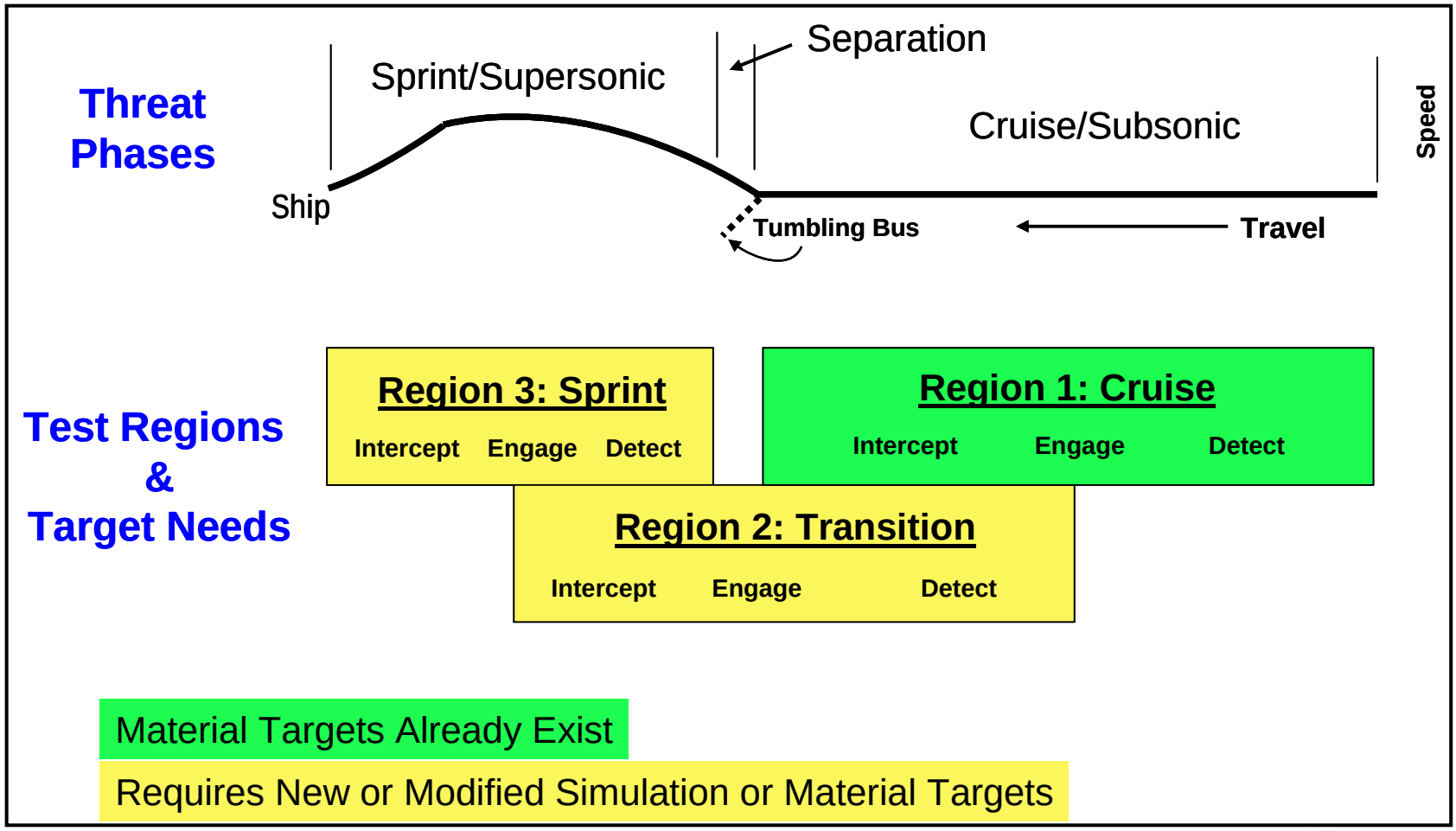
- **Potential high-diver surrogate**
  - Low fidelity

Threat D and Multi-Stage Supersonic Target (MSST)

The case for a Threat D target has been kicked around for years . . .

Threat D

- **Threat D poses challenging T&E requirements**



Multi-Stage Supersonic Target

- Requirement & Resourcing
  - Navy did not fund target development in POM-08 budget submission
  - DEPSECDEF directed Threat D study. Study completed April 2007
  - Study recommended target development. Navy endorsed.
  - OSD 3-Star Programmer review supported the development of a Threat D Target
    - Agreed with study conclusions and Navy's recommendation
  - October 2007 - CDD in Final Navy review, approval anticipated mid-November 2007

- Acquisition
  - PMA-208 MSST team stood up in May 2007
  - Draft RFP posted 25 July 2007
  - Industry Day held 31 July 2007
  - Planning to release Request For Proposal (RFP) in November 2007
  - Anticipating 4.5 year System Development & Demonstration effort, with follow-on contract for Low Rate Initial Production and Full Rate Production
    - Planning to award SDD contract in FY08

Supersonic Summary

- GQM-163 Coyote in production
  - Meets Threat A, B, & C SSST requirements
  - Superb performance. Coyote will be long term workhorse for SSST mission
  - GQM-163 high dive capability being developed
- MA-31
  - Last assets will be expended in December 2007
  - Program to be completed
- AQM-37
  - Potential near-term high diver surrogate
- Multi-Stage Supersonic Target
  - Navy Team stood up May 2007
  - CDD in final approval process
  - RFP release planned for November 2007
  - Anticipated contract award 3rd quarter FY08

Subsonic Targets

BQM-34S

- **Sustainment**
  - Maintain required inventory
- **Missions**
  - Low fidelity A/C simulator
  - T&E workhorse – special configurations
    - Harpoon Seeker integration
- **Product Improvements**
  - UIAU integration:
    - Replace existing autopilots with UIAU from BQM-74
    - Common avionics, radar altimeter, Support Equipment with current production BQM-74E
    - Reduced logistics
    - Avoid obsolescence
    - Allows for performance growth if required
      - LACE
      - PAWN
- **Prime contractor – Northrop Grumman**

Current Inventory ~ 200
FY06 Ops/Expenditures – 19/2
FY07 Ops/Expenditures – 14/3

BQM-74E

- **Production**
  - Procurement rate 60/yr
  - Training and T&E workhorse

Current Inventory ~ 265
FY06 Ops/Expenditures – 235/62
FY07 Ops/Expenditures – 158/52

- **Missions:**
  - High fidelity Anti-Ship Cruise Missile (ASCM) Surrogate
  - Low-fidelity A/C simulator
    - Altitude: 7 ft – 40 Kft
    - Endurance: 68 min
    - Ground Launch; Shipboard Launch;
    - Air Launch: C-130, Gulfstream, F-16

- **Product improvements**
  - Programmable semi-autonomous waypoint navigation
    - Selectable Lost Carrier Sensitivity from waypoint to waypoint
    - Return to Recovery Area
    - FY08 limited fielding planned
- **Prime contractor – Northrop Grumman**

Subscale Subsonic Aerial Target (SSAT)

- Need for a high fidelity subsonic target vehicle that meets Navy requirements
- Performance requirements being validated
- Considering full and open competition for a fly-off
  - Opportunity for Navy to evaluate SSAT candidates
  - Potential for RFP release in late FY08/early FY09
  - Potential multiple award in FY09 for fly-off
    - Down select to single source for production

Alternative Subsonic Flight Demonstration

- Navy strategy to “open aperture” to explore wider range of subsonic targets that may fulfill Navy needs
  - Goal is to ensure long-term best value – performance & affordability
  - Demonstration initiative underway

- Contract competitively awarded to Composite Engineering, Inc. (CEi) of Sacramento, CA in September 06
  - Design based on Air Force BQM-167A
  - Five flight demonstrations planned
    - First flight 26 September
    - Second flight planned for 31 October

Subsonic Targets Summary

- ASCM Threat capabilities drive Navy subsonic target requirements
- BQM-34 still a viable system
  - Existing inventory will last indefinitely at current usage rate
- BQM-74E remains Navy workhorse
  - Relatively low cost
  - Shipboard & air launch capable
- Follow-on subsonic target needed to meet current requirements

Navy pursuing strategy to identify tomorrow's subsonic target

Full Scale Targets

QF-4/QF-16

- QF-4
  - Operating at Tyndall & White Sands Test Ranges
  - Air Force existing contract runs thru Lot 15 (FY09)
  - Plan to award new contract for two Lots in FY-10 & FY11
  - Last deliveries in FY13 from procurements in FY-11
- AST QF-16
  - Replacement for the QF-4
  - Air Force lead program
    - Navy providing requirements inputs and funding
  - IOC 3QFY15
  - ~15 years of production at 25 A/C per year

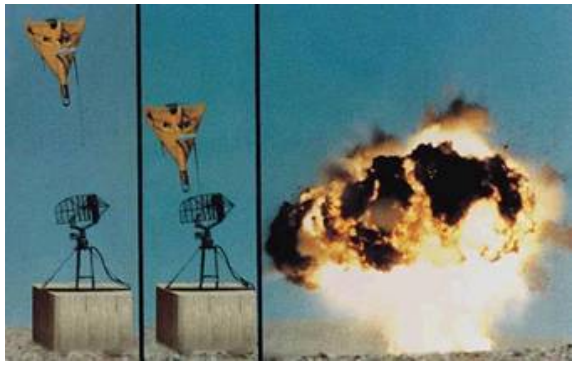
Mobile Land Targets

- **Requirement**
  - Fast, highly maneuverable, threat representative vehicles for aircrew training
  - Enable JTACS & aircrew to identify & engage moving targets not normally associated with traditional enemy forces

- **FY08 Planning**
  - Low Rate Initial Production award
  - 'Kit' concept
    - Vehicle
      - New or used
      - Control System
      - Autonomous or remote controlled

UAV Target

- Requirement
  - Provide the Navy/Marine Corps a test capability to represent an attack UAV that can:
    - Loiter above the battlefield
    - Search and home in on specified targets/ signals
    - Dives ~90° on the target
    - Detonate high explosives
- No existing targets are threat representative
- Working with requirements office to formalize requirement



Target Control System

System for Naval Target Control
UHF 360 – 380 MHz

Current: SNTC System

- **UHF 435–450 MHz**
- **Single Frequency at a time**
- **BQM-74/BQM-34 capable/HSMST/QST-35 Sea-borne Targets**
- **Low transponder cost**
- **200 nmi line of sight**
- **330 nmi via Relay**
- **Training/T&E**

Future: SNTC System
UHF 360-380 MHz Upgrade

- Recommended primary user status by Navy Marine Corp. Spectrum Center (NMSC)
  - 250-300 KHz bandwidth available to accommodate full scale capability and future system growth

- **UHF 360-380 MHz**
- **Changes Freq to avoid interference**
- **BQM-74/BQM-34 capable**
- **HSMST/QST-35 Sea-borne targets capable**
- **Low transponder cost**
- **200 nmi line of sight**
- **330 nmi via Relay**
- **Training/T&E**

Target System Challenges

Evolution of the threats

- Supersonic dive
- Asymmetric threats
- Enhanced threat capability
- Stealth
- Scramjet . . . *Mach 5 and beyond*

Programmatic

- Cost control – acquisition & operations
- Meeting evolving requirements - more extensive and accurate representation of threat
- Obsolescence
- Reconfiguration, reuse, and versatility
- Inventory management

The Way Ahead

The threats will continue to evolve. The Navy Target Team will continue to work with all stakeholders to provide required threat representations to meet the needs of developmental testing, operational evaluation and Fleet training.

Teaming with our Industry partners and Service counterparts is key to our continued success

Back-Ups

PMA-208
Aerial Target & Decoy Systems Program Office
September 2007

DPM ACQ AND OPS
ANNA SCHIBLER, PMA-208C
OPS ASST: SCOTT BAKER, (DPA)
NMCI: DALE FORD, (DPA)
ACQ ASST: PAM BARBER-MILLS (WYLE)

CHIEF ENGINEER
STEVE CLOAK, AIR-4.1

CLASS DESK
CDR KEITH QUINCY, AIR 4.1

DIRECTOR OF LOGISTICS
PAT SEESE, AIR-6.0

FINANCIAL TEAM LEAD
LCDR KEVIN WRIGHT, PMA-208B

FMS
CASE MGR: JIM STUBBS, PMA-2086
FMS ASST: ANDREA DYSON (TITAN)

STATEGIC INITATIVES
LIZ EAGLES, PMA-2082C

T&E ENGINEER
KEITH SHANAHAN, AIR-5.1

OFFICE OF COUNSEL
ROBERT MCCALL, AIR-11.0

CONTRACTING OFFICER
MIKE MCLOUGHLIN, AIR-2.4.4.2

FLEET LIAISON
VACANT, PMA-208D

COST ANALYST
CAMERON BRUCE, AIR-4.2.6

TRAINING SYSTEMS
AOC BILL DEVINE, PMA-205

CONFIGURATION MGMT
CM LEAD: JUDY WOLLIN, (DPA)
ASST: JILL TROSSBACH (DPA)

CSS PROGRAM MANAGER
DOC O'CONNELL (DPA)

TTSP/ETG
TOM WILLIAMS, PMA2087

DECOY SYSTEMS
DAN WRIGHT, PMA-2085

PROGRAM MANAGER
CAPT PAT BUCKLEY
PMA-208

PRINCIPAL DEPUTY
TIM BARNES
PMA-208A

MGMT ASST/SECRETARIAL
DEBI WILKERSON, PMA-208S

•MSST TARGET IPT
DOUG TROLLINGER, PMA-2088

Integrated Product Team Leads
DIPTL: VACANT, PMA / WD539100E

LOGISTICS
ED WORKMEISTER, WD663200E
PETE RONBECK, (SYNECTIC SOLUTIONS)

SYSTEMS ENGINEERING
STEVEN CLOAK (acting), AIR 4.1
VACANT, AIR 4.1

BFM
MICAH SPIEGEL, PMA-208B1

CONTRACTS
FRANK FISHER, AIR-2.4.4.2

ACQUISITION SUPPORT
ACQ ASST: PAM BARBER-MILLS (WYLE)

SUBSONICS: SUE BANASZAK, (CAMBER)

SUPERSONIC TARGET SYSTEMS IPT
CHARLIE MANSON, PMA-2081

Integrated Product Team Leads
GQM-163 IPTL: MICAH SPIEGEL, PMA-2081B
HIGH DIVER DIPTL: MATT LOTTS, WD539100E
MA-31 IPTL: CAROL LEYRER, PMA-2082B
AQM-37 IPTL: LARRY HOGE PMA2081A

LOGISTICS
GQM-163: DAN SPENCER, WD663200E
AQM-37: RICHARD GOMEZ, WD663200E
MA-31: CESAR AFANADOR, WD663200E
SUPERSONICS: PETE RONBECK, (SYNECTIC SOLUTIONS)

SYSTEMS ENGINEERING
MA-31/GQM-163: PETE PATEL, AIR-4.1

BFM
GQM-163/MA-31/FSA: MICAH SPIEGEL, PMA-208B1
AQM-37: STEVE PALM, PMA-208B2

CONTRACTS
MA-31: DIANE STABILE, AIR-2.4.4.2
GQM-163: KEVIN FAUGHNAN/ KELLY CHISM, AIR-2.4.4.2

ACQUISITION SUPPORT
MA-31/AQM-37: STEVE ADRIAN, (DPA)
GQM-163: STEPHANIE BARNETT, (DPA)

FULL SCALE AND SUBSONIC TARGET SYSTEMS IPT
RAY GAGNON, PMA-2082

Integrated Product Team Leads
BQM-34/74E IPTL: SHELLEY HALL, PMA2082A
AST/QF-4 IPTL: CAROL LEYRER, PMA2082B
UAV/GRD IPTL: LIZ EAGLES, PMA2082C

LOGISTICS
BQM TARGETS: SHELLEY HALL, WD663200E
QLT-1: RICHARD GOMEZ, WD663200E
SUBSONICS: PETE RONBECK, (SYNECTIC SOLUTIONS)

SYSTEMS ENGINEERING
BQM-34: PETE PATEL, AIR 4.1
BQM-74E: STEVEN ON, AIR 4.1
BQM-74E: JOHNNY RESTIVO, (UNI)

BFM
AST/QF-4: MICAH SPIEGEL, PMA208B1
BQM-34/74/QLT-1: VACANT, (TITAN)

CONTRACTS
BQM-34/74: FRANK FISHER, AIR- 2.4.4.2

ACQUISITION SUPPORT
AST/QF-4: TOM DIDOMENICO, (SVERDRUP)
BQM-34/74: VACANT

**** SSAT DEVELOPMENT IPT**
VACANT, PMA-2083

Integrated Product Team Leads
SSAT DIPTL: DAVE WHITSON, WD539100E

LOGISTICS
SSAT: SHELLEY HALL, WD663200E
SSAT: TOM PORTER, WD6631

SYSTEMS ENGINEERING
SSAT: ART NAKAS, AIR-4.1
T&E: TOM JAMESON, WD531100E

BFM
SSAT: MICAH SPIEGEL, PMA-208B1

CONTRACTS
SSAT: FRANK FISHER, AIR-2.4.4.2

ACQUISITION SUPPORT
SSAT: SUE BANASZAK, (CAMBER
SSAT: JOHNNY RESTIVO, (UNI)

CONTROL SYSTEMS AND COMMON TAAS IPT
LCDR CHRIS SACCO, PMA-2084

Integrated Product Team Leads
TCS IPTL: TRACY BURROWS, PMA-2084A
DIPTL: DARYL JUE, WD531300E

TCS/TAAS/TDU IPTL: RICHARD GOMEZ, WD663200E
DIPT: VACANT

LOGISTICS
TCS/TAAS: RICHARD GOMEZ, WD663200E

SYSTEMS ENGINEERING
TCS: STEVEN ON, AIR-4.1
TAAS: JUAN MOREIRA, AIR-4.1

BFM
TCS: VACANT
TAAS/TTSP: STEVE PALM, PMA-208B2

CONTRACTS
TCS: VICKEY MUDD, AIR-2.4.4.2 AIR-2.4.4.2
TAAS/TDU: BRYSON JO, WD230000E

KEY
PMA208 BILLET
NAWC BILLET
CSS BILLET

• MSST – Multi-Stage Supersonic Target
**SSAT Subsonic Subscale Aerial Target

U. S. ARMY
TARGETS MANAGEMENT OFFICE

GPS-Based Target Control Software Innovations

BRIEFER:

J. Dennis Brooks
Project Director, Army Target Control Systems
256-842-0376
E-MAIL: dennis.brooks2@us.army.mil

Background

The Army Targets Management Office, a division of PM for Instrumentation Targets and Threat Simulators, provides target presentations worldwide & provides lifecycle support of aerial and ground targets.

- **Targets**
  - MQM-107D, E, IAP
  - QUH-1 Helicopter.
  - BQM-34
  - MQM-171 (Broadsword)
  - QH-50 Helicopter
  - QAH-1 Helicopter
  - MQM-170 (Outlaw)
  - Mobile Ground Targets

Army
Targets Management Office

TTCS Introduction

Background

Original TTCS –Vega Corp.
1976-2004

Next Generation TTCSR –
Micro Systems, Inc.
1989-Present

Current Generation TTCSU –
Micro Systems, Inc.
1998-Present

TTCS

Army's Primary Target Control System for Rotary Wing and Subscale Targets!

Variations

QTY

1- **FIXED SITE**

8- **TRANSPORTABLE SHELTERS**

2- **PORTABLE UNITS**

Configuration

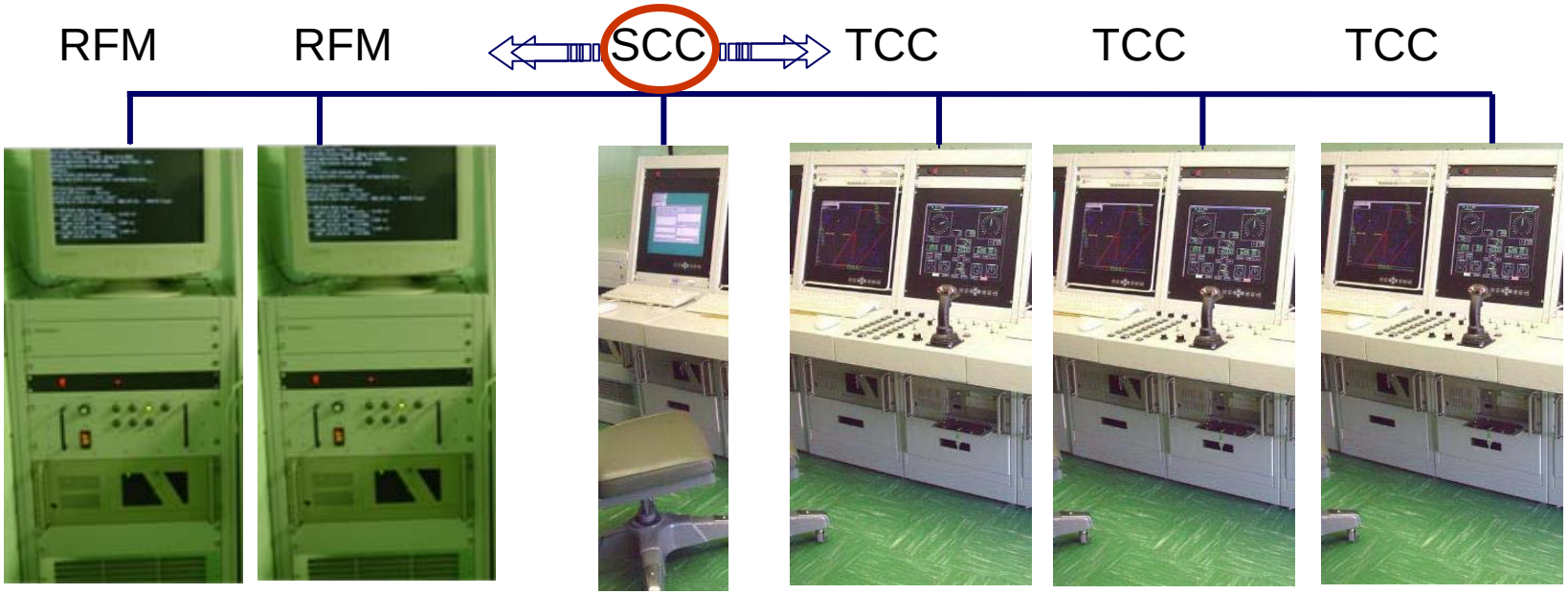
- **System Control Console**
- **Target Control Console**
  - Position Display Subsystem (PDS)
  - Telemetry Display Subsystem (TDS)
  - Trainer/Simulator (Stealth)
- **Radio Frequency Unit**
  - 2 transceiver sections (RFM)

- Based on "Montage" control system developed by MSI.
- Montage is also the basis for the Navy AFWTF control system (decommissioned) and the SNTC.
- Each TTCS Shelter Contains:
  - Two TCCs
  - Two T/S
  - One SCC
  - One RFU
- Each shelter capable of controlling 2 targets.
- Each RFU capable of controlling 4 targets
- Cost effective life cycle.
  - Procurement
  - Maintenance
  - Sustainment
- Faraday shelter (EMI Insulated) protects ground equipment in high EM field environments.

Capabilities

- **System Control Console**
- **Target Control Console**
- **Radio Frequency Unit**

- System Control Console (SCC) is the "Master Coordinator" of the TCS.
- Up to 8 Target Control Consoles (TCC) can be added to a SCC
- Up to 4 Radio Frequency Modules (RFM) can be added to the SCC
- SCC coordinates RF frequency and TCC assignments.

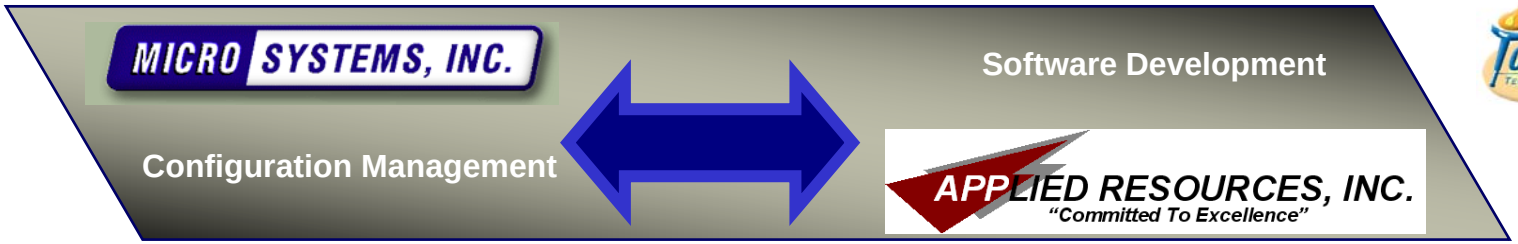


Army
Targets Management Office

New Target Control Software Tools

Software

- TTCS target control is through joystick, discrete and proportional commands.
  - Very precise value input
  - Ability to follow straight flight track very closely.
  - Flight track in turns is extremely difficult.
- Major capability update to automated control.
  - ***Rabbit Follower (RF).***
  - ***Improved Low Altitude Threat Simulation (ILATS).***
  - ***Autonomous MQM-107IAP.***



Software

- ***Rabbit Follower***
  - Based on DFCS & GRDCS software algorithms and source code.
  - Mission planning upgraded to “point and click” drawing tools.
  - Improvements in tracking errors and throttle handling algorithms.
    - Max cross track error nominally < 100ft.
  - Includes formation offset capability.

Software

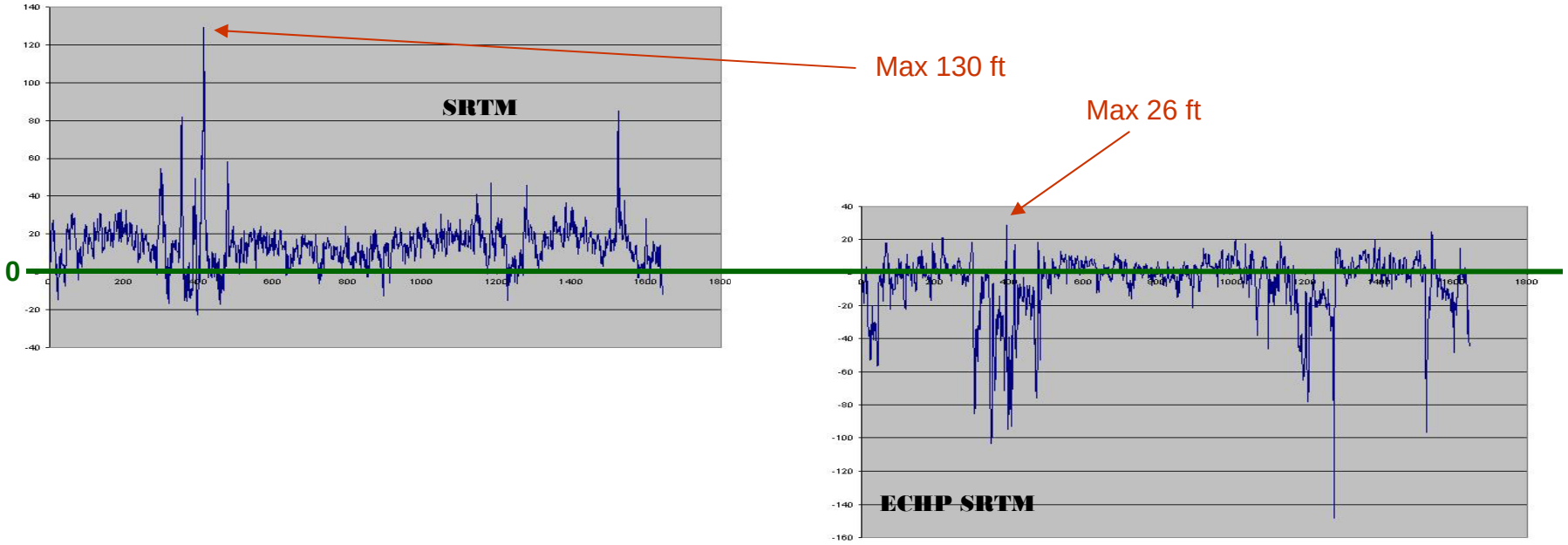
- ***Improved Low Altitude Threat Simulation (ILATS)***
  - Perform low altitude terrain following with or without radar altimeter augmentation.
  - Terrain look-ahead distance settable.
  - Allows use of any of several digital terrain databases.
  - Database information augmented by Ellipsoid and High Point processing.
  - Best performance (simulation) with SRTM data over DTED I / II.
    - DTED Level 1 data are too widely spaced, leaving room for peaks well above the posts.
    - DTED Level 2 data is available but bulky. *(24 Geocells take over 600 MB in RAM.)*
    - SRTM ECHP data is suitably detailed for subscale aircraft missions.
      - Combines Level 2 Information with Level 1 Storage Size
  - Multiple test flights down to 100 feet AGL

Software

- ***Ellipsoid***
  - SRTM & DTED Data are provided as EGM96 referenced data
    - EGM96 is a Standard Geoid
  - The MQM-107 GPS provides position relative to the WGS84 Standard Ellipsoid
    - A table provides EGM96 to WGS84 differences
  - Pre-flight converted files eliminate need for real-time conversion, many times per second

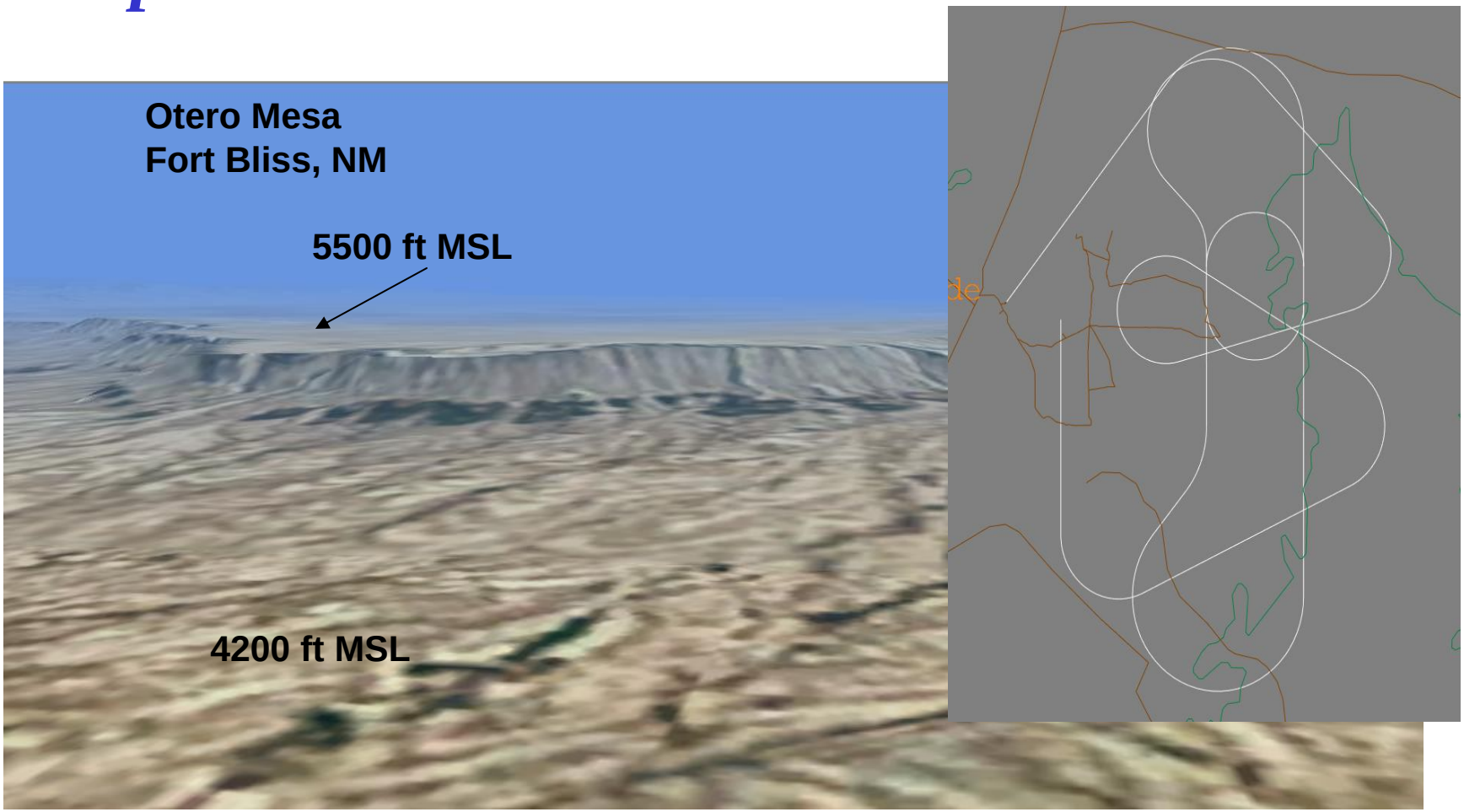
Software

- ## High Point Processing
  - Un-processed DTED1, DTED2, SRTM1 or SRTM2 would drive altitudes up to stay safe.
    - Graphical data shows the differences between terrain clearances computed from GPS altitude and the databases and mission data based on an on-board radar altimeter.
    - Data = Computed – Measured
    - ***Positive Values are dangerous*** (computed values expected greater clearance than reality provided).
    - ***Negative values show we would fly higher than desired.***



Software

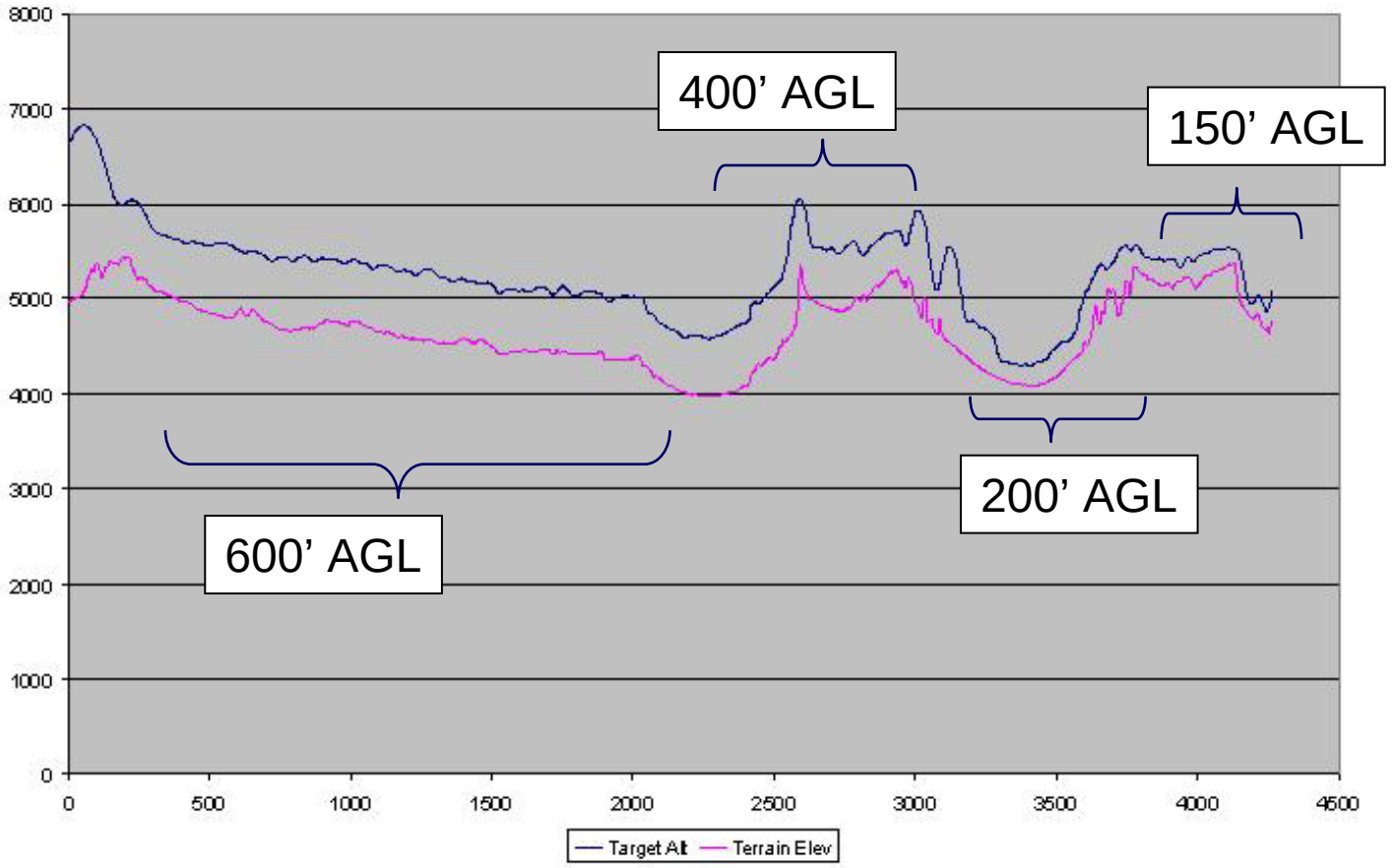
- *Improved Low Altitude Threat Simulation*



Software

- ***Improved Low Altitude Threat Simulation***

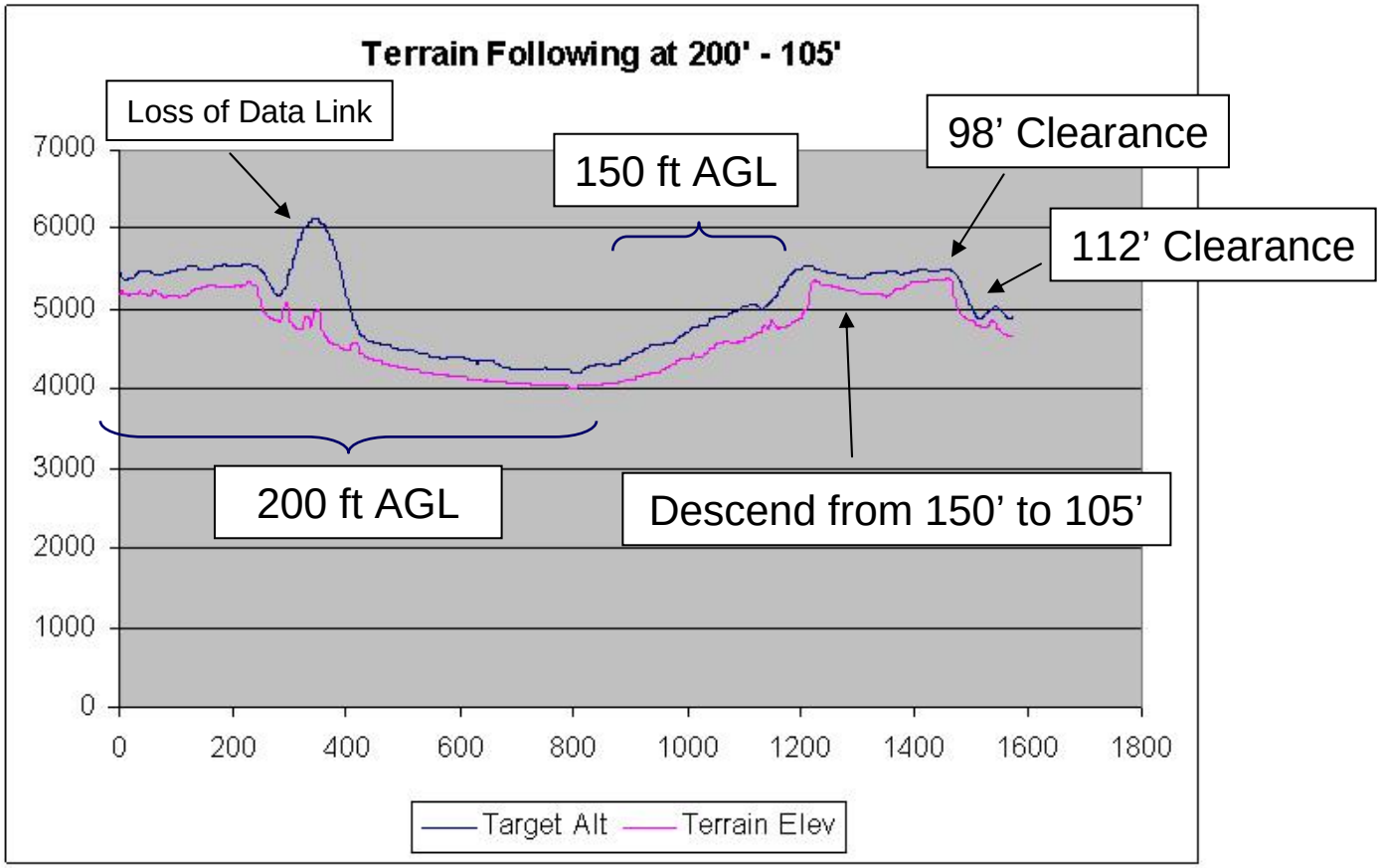
Flight #1 at 350 Kts, Data at 4.5 Hz, 17.5 Minutes Flight Time



Software

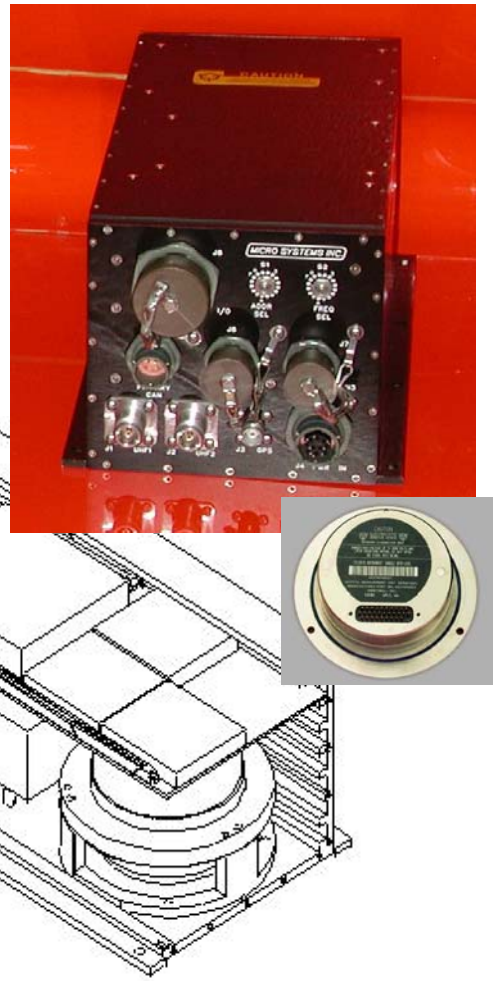
- ***Improved Low Altitude Threat Simulation***

Flight #2 at 350 Kts, Data at 4.5 Hz, 5.8 Minutes Flight Time



Software

- ***Autonomous MQM-107IAP***
  - **Use PDS mission planning tools to create flight profile**
  - **Upload to Common Avionics Package with laptop.**
  - **Maintained UHF data link during test mission.**
  - **Track error slightly larger than RF.**
  - **Discrete commands for smoke and auto recovery did not work.**
    - ***Fix known, not implemented.***



Summary

RF, ILATS, and Autonomous capability provides significant capability improvements to targets and mobile target control assets.

Shaping Technology into Tomorrow's T&E Capabilities

Gerry Christeson

Test Resource Management Center

Office of the Under Secretary of Defense

(Acquisition, Technology and Logistics)

October 31, 2007

Outline

- **Overview of TRMC**
- **The Investment Mission**
  - Test & Evaluation/Science & Technology (T&E/S&T) Program
- **The Strategic Planning Mission**
  - CY2007 Strategic Plan Highlights
  - CY2005 Targets Gaps Resolution Case Study

FY2003
National Defense Authorization Act

Established
TRMC

- DoD Field Activity
- Direct Report to USD(AT&L)

★★★ SES Director

Oversee
T&E Budgets

MRTFB
Other T&E Facilities
Within & Outside DoD

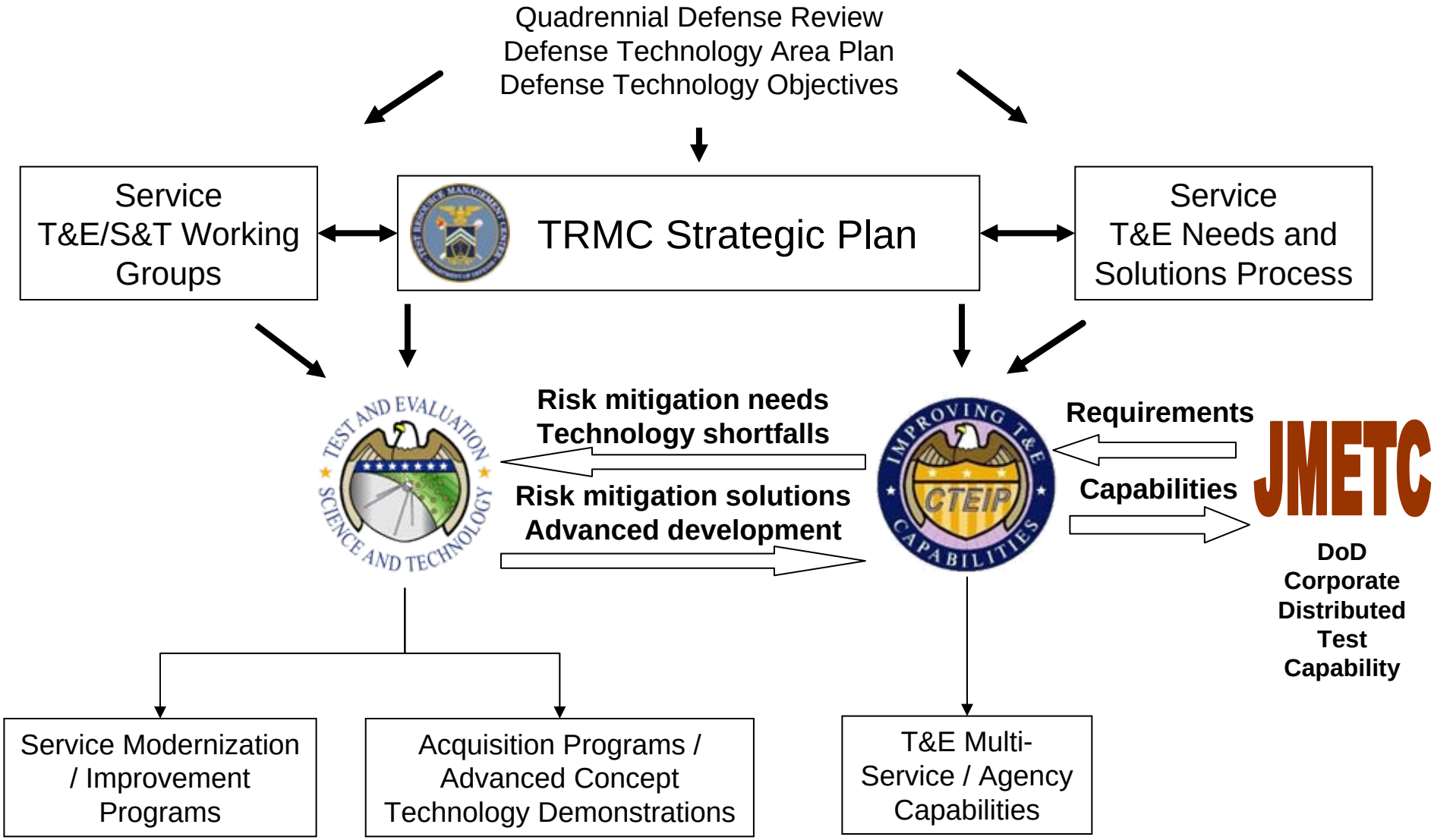
Biennial 10-Year
Strategic Planning

Annual T&E Budget
Certification
Military Departments
& Defense Agencies

Administer
T&E Investment
Programs
CTEIP
T&E/S&T

TRMC Investment Programs

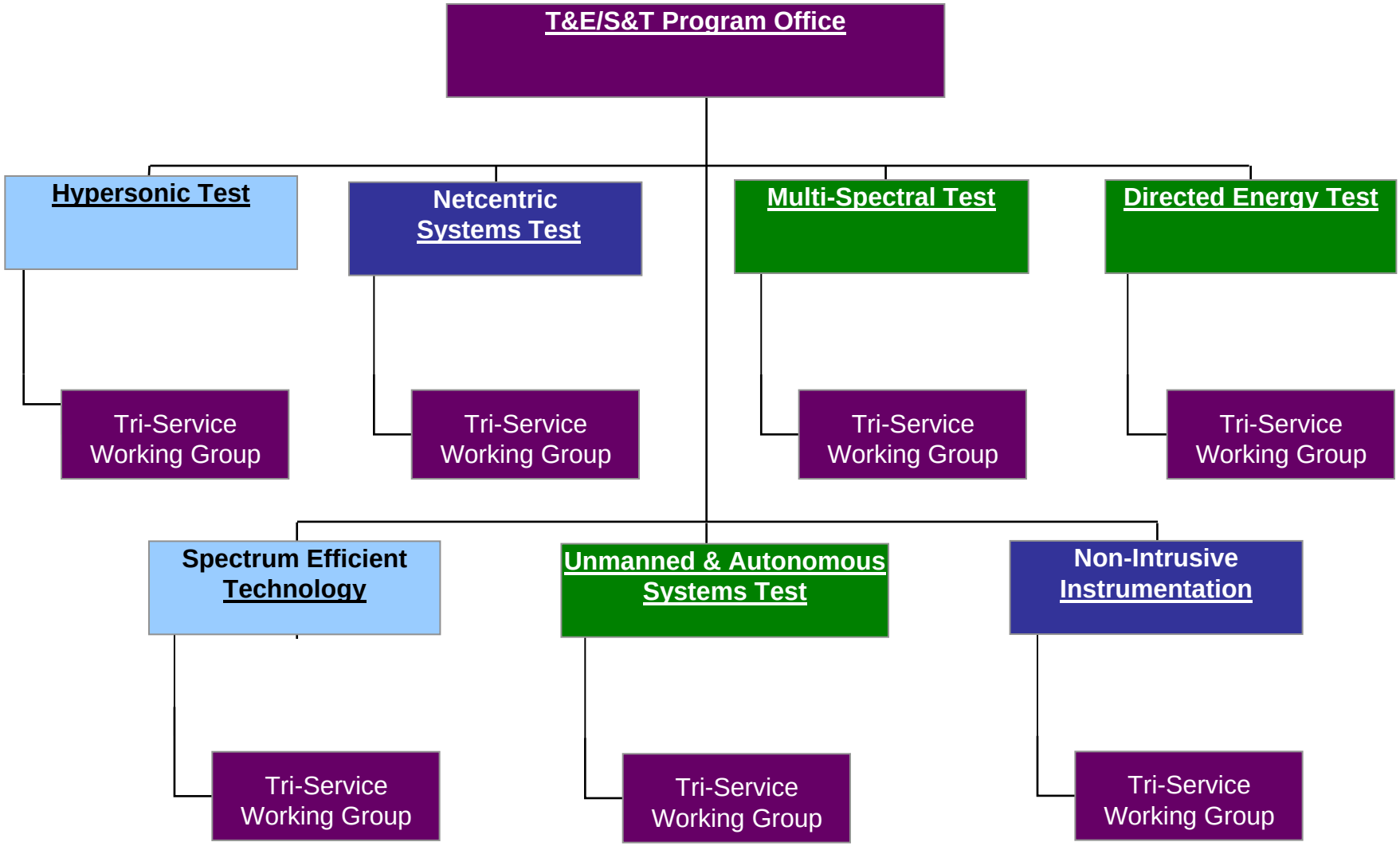
Synergy through Aligned Investment



T&E/S&T Program
Overview

- **Program started in FY 2002**
  - **Joint DDR&E / DOT&E initiative**
  - **Transitioned to TRMC in Feb 2005**
- **Mission**
  - **Investigate and develop new technologies required to test and evaluate our transforming military capabilities**
    - Mature technologies from TRL 3 to 6
    - Includes any system that makes our warfighters more survivable and effective in combat
      - Lethal and non-lethal weapons
      - Intelligence surveillance and reconnaissance
- **Goal**
  - **Transition emerging technologies into test capabilities in time to verify warfighting performance**

T&E/S&T Program Structure



T&E/S&T Program
Project Selection Process

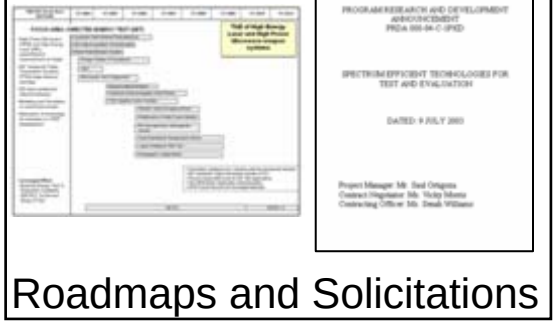
Drivers

Solicitations are issued through http://www.fedbizopps.gov

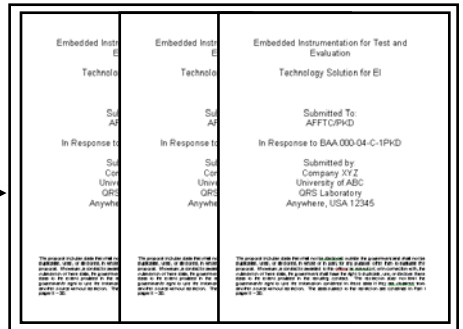
Tri-Service Focus Area Working Group

- Executing Agent
- T&E Community Reps
- S&T Community Reps
- Subject Matter Experts

T&E Needs/Requirements



Roadmaps and Solicitations



Proposals

Source Selection Evaluation Team

- Working Group
- Subject Matter Experts
- Contracting Reps

Recommendations

Executing Agent

Final Selections

Program Manager

Funding Decision

Focus Area Execution

T&E/S&T Program Active Focus Areas

Test Technologies for

- Emerging Warfighting Capabilities
  - Hypersonic Vehicles
    - 14 active projects
  - Directed Energy Weapons
    - 20 active projects
  - Multi-Spectral / Hyper-Spectral Sensors
    - 9 active projects
  - Netcentric Warfare Systems
    - 13 active projects
  - Unmanned and Autonomous Systems
    - 5 active projects
- Enhanced Test Capabilities
  - Spectrum Efficient Technology
    - 15 active projects
  - Non-Intrusive Instrumentation
    - 13 active projects
- 89 Active Projects

Example: Directed Energy Test

T&E GAPS

- Target sub-systems HEL protection
- Target sub-systems HPM surety
- Target surface temperature measurement
- Target Surrogate Materials
- Surface target incident irradiance/fluence measurement
- Airborne target irradiance and imagery resolution
- Ability to measure HPM fields non-intrusively

S&T Challenges

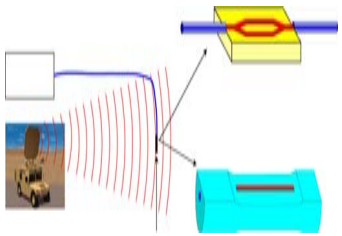
- Develop laser protected antenna
- Develop Quantum Well Infrared Photodetector (QWIP) focal plane array
- Develop holographic diffusive target board using photo-thermo-refractive (PTR) glass
- Develop scene-based cross correlation adaptive optics
- Develop reflectance and dynamic fusion models
- Develop non-intrusive HPM sensors

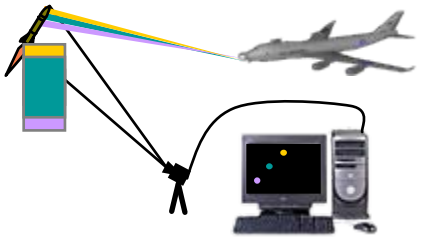
Transitions/Successes

- Microwave Test Diagnostics Recorder integrated within Directed Energy Test and Evaluation Capability (DETEC) HPM Sensor Suite.
- T&E Adaptive Optics System integration with WSMR HEL Advanced Pointer Tracker (APT)

Budget ($M)

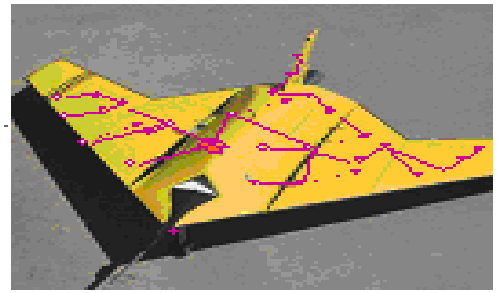
	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13
Directed Energy Test	8.83	14.58	23.01	23.07	22.95	23.29	23.42





UAST Example
Remote Embedded System Test

T&E GAPS
- Long duration, light weight hybrid power/energy system for reliable UAS operation of onboard sensors and data transmission devices.



S&T Challenges
- Developing "fail safe" methods to power UAS sensors even when operational control systems have been compromised.

Transition Partners
- CTEIP- Framework for Advanced Modeling Environment, Unmanned and Autonomous System Test, Next Generation TSPI Instrumentation

Description
- Research and develop methodologies to harvest energy from such sources as thermal, piezoelectric, vibration
- Self healing on-board sensor network

UAST Technology Topic Addressed
Topic 5: Power/Energy Management to Support UAST

Budget ($M)

FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	Total
.246	.994	.577	0	0	0	1.817

Deliverables

FY08	Demo w/ wired vibration nodes
FY09	Demo graceful node degradation
FY10	Demo robustness and scalability

Budget

$Millions											
FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
7.9	8.6	12.8	14.7	22.6	38.8	62.9	94.9	97.3	98.9	100.4	101.9

- $24M Budget Growth in FY08
- Additional $32M Budget Growth in FY09

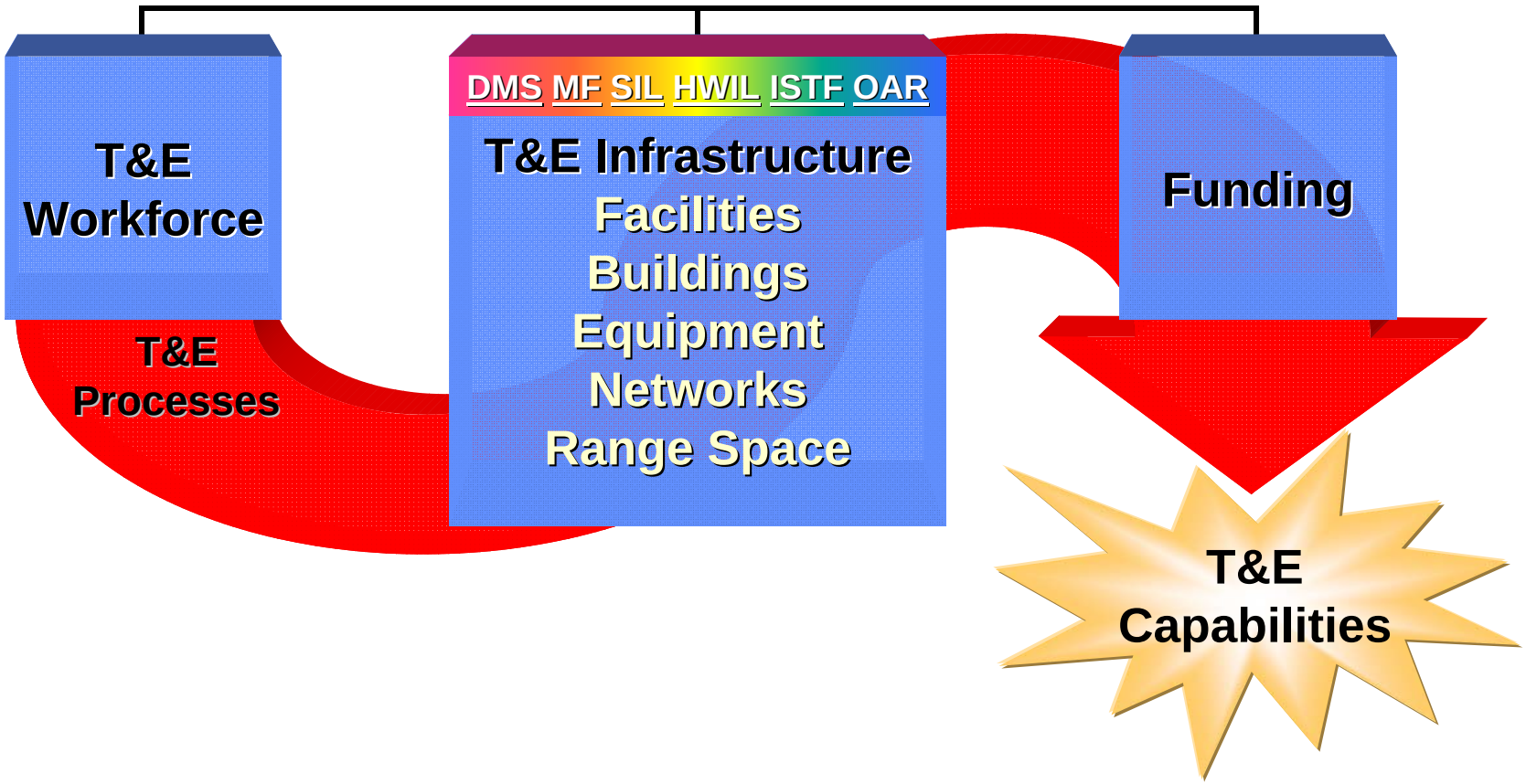
Shaping Technology into Tomorrow's T&E Capabilities

- **T&E/S&T program is maturing technology to meet critical T&E needs**
  - Transition emerging technologies in time to verify warfighting performance
  - Maturing technologies that will facilitate the integration of Test and Training
- **Sustained growth and demonstrated value**
  - 89 projects ongoing across 7 focus areas
  - FY09/10 Budget Ramp expands opportunities
- **Successful Partnership with Services, Laboratories, Industry, and Academia**

T&E/S&T Industry Days 19-21 February 2008

(San Diego Marriott La Jolla)

Strategic Planning for DoD's T&E Resources



T&E Resources: A collective term that encompasses the requisite **Workforce**, **Infrastructure** and **Funding** resulting in a **T&E Capability**, by means of the **T&E Processes**

The Strategic Plan Tactical View:
Test Capability Areas

- *Air Combat*
- *Land Combat*
- *Sea Combat*
- *Space Combat*
- *Electronic Combat*
- *C4ISR*
- *Armaments and Munitions*
- *Targets and Threats*
- *Common Range Instrumentation*
- *Test Environments*

Follows Tri-Service T&E Executive Agent's Reliance Taxonomy

Test Capability Area
Risk Assessment

TRCs / TCAs	Digital Modeling & Simulation (DMS)	Measurement Facilities (MF)	Integration Laboratories (IL)	Hardware in-the-Loop Facilities (HITL)	Installed System Test Facilities (ISTF)	Open Air Ranges (OAR)
Air Combat						
Land Combat						
Sea Combat						
Space Combat						
Electronic Combat						
C^4ISR						
Armaments/ Munitions						
Targets and Threats						
Common Range Instrumentation						
Test Environments						

T&E Requirements 2008-2011

GREEN **assessment indicates that sufficient capabilities exist within a Test Resource Category for a corresponding TCA to meet current T&E requirements.**

YELLOW **assessment indicates that sufficient capabilities do not exist within a Test Resource Category for a corresponding TCA, however, T&E can be conducted in a less-than-efficient manner with resulting higher risks being absorbed by development and acquisition programs.**

RED **assessment indicates that severe capability limitations exist within a Test Resource Category for a corresponding TCA and high risks are being absorbed by major acquisition programs as a result of these deficiencies.**

T&E Gaps Examples

Gap Title	Rationale/Description	Action	Date
Low-speed Aerial Icing	**Improved test capability is needed to certify rotary wing, low-speed fixed wing aircraft, and unmanned aerial vehicles to fly in icing conditions. Legacy capability does not support full icing qualification IAW FAR 25C and is incompatible with unmanned aerial systems station keeping requirements.**	Army	FOC 2012
Multiple Small Craft Attack Scoring Capability	**Programs such as LCS, DDG 1000, CVN-21, CG(X), will require demonstration of survivability in a swarm attack environment. While progress is being made in the target control arena, the ability to score a gunnery test in the small craft swarm environment remains an issue. Ongoing proof of concept initiative has been unable to deliver a capability that can be employed in full scale test scenarios.**	Navy	FOC 2012
TSPI in a GPS-denied Environment	**Accurate Time Space Positioning Information (TSPI) data (<1m) is critical for resolving RTCA issues and evaluating performance and effectiveness of Land Combat systems, including FCS and Ground Soldier Systems in an UE. Current (Global Positioning System) GPS-based TSPI capabilities will not reliably track forces located inside buildings and underground tunnels. Additionally, open-air players frequently experience satellite signal "dropout" due to building obstructions, threat jamming, and other co-channel interference effects unique to an operating area's electromagnetic environment.**	TRMC	IOC 2014

"Strategic" View:
Focus Areas

- **Strategic Issues in the DoD derived from high-level Departmental Guidance**
  - *Directed Energy*
  - *Nuclear Weapons Effects*
  - *Hypersonics*
  - *Distributed Test*
  - *Urban Test Environments*
  - *Unmanned and Autonomous Systems*
  - *IED Defeat*

Examples - Focus Area Issues/Actions

Directed Energy:

Develop a Directed Energy Test and Evaluation Capability Tri-Service Study Phase 2 capability roadmap to establish a time phased OAR infrastructure modernization plan to meet future DEW test requirements. **(Lead: Army - CTEIP)**

Hypersonics:

Conduct a study of OAR T&E capabilities (e.g. range space, instrumentation, test control) needed to test hypersonic air vehicles through launch, cruise, and recovery flight regimes. **(Lead: Air Force)**

Urban Test Environment:

Conduct a Joint DoD Agency/Service study to define requirements for a realistic, reconfigurable, instrumented urban test environment that best makes use of existing DoD infrastructure and distributed LVC capabilities. **(Lead: Army)**

Unmanned and Autonomous Systems:

Complete a requirements analysis of instrumentation, measurement, monitoring, and control capabilities needed for UAS testing and develop UAS T&E capabilities roadmap.
(Lead: Army – T&E/S&T)

The Gaps Resolution Challenge

“Everything is very simple in War, but the simplest thing is difficult.”

CARL VON CLAUSEWITZ

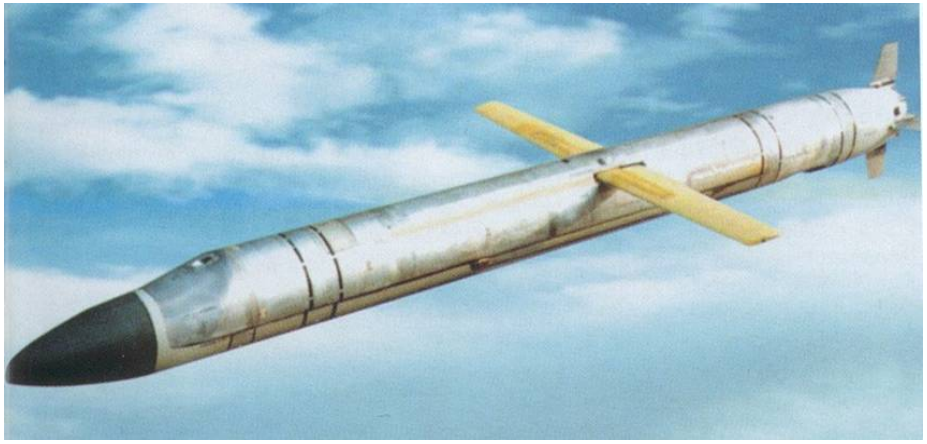
1832

Threat D

Supersonic Anti-Ship Cruise Missile (ASCM) Target

Required T&E Capabilities

- Advanced supersonic sea skimming target that represents the full range of intelligence validated air vehicle signature and "transition profile" maneuver performance
  - Sprint vehicle separation
  - Acceleration profile
  - Terminal velocity
- Current Capability: None



Supersonic Target

T&E Program Drivers

- Multiple ship self-defense weapons systems to include:
  - Standard Missile (SM-6 TEMP need date FY10/11)
  - Self Defense Test Ship Testing (SDTS TEMP need date FY11/12)
  - LPD-17 & CVN-21
  - DD(X)

Gap Resolution (As of Sep 2005)

Threat "D" RDT&E Funding Profile ($M)

FY	07	08	09	10
Funded	22.9	10.6	0	0
Required	22.9	52.5	42.3	12.7
Delta		(41.9)	(42.3)	(12.7)

SM-6 & SDTS test dates at High Risk unless Navy provides full RDT&E funding in POM-08

GAP Resolution Chronology

Sep 2005	CY 2005 Strategic Plan Released
Dec 2005	TRMC “Critical Gaps” Memorandum to Services
Mar 2006	OSD Stakeholders Approve Threat D Target Acquisition Strategy
Aug 2006	SP Addendum Reaffirms Gap/Requirement
Aug 2006	Navy POM-08 “Zeros” Threat D Funding
Sep 2006	DOT&E/TRMC Submit Targets POM Issue Paper
Oct 2006	PA&E Targets Issue Team Reaffirms Requirement - “End-user Pays” Offsets
Oct 2006	3-Star Programmers …”Deal or No Deal”
Nov 2006	PDM-II Directs Additional Threat D Study
Jan 2007	Navy (JH-APL) Begin “Alternatives” Study

Resolution Chronology Cont.

Mar 2007	Study Team Recommends Multi-stage Target
Apr 2007	Congressional Staff Weighs In - RFI
Apr 2007	3-Star Programmers Accept Recommendations
Jul 2007	SASC Language – More ASCM Target Studies
Aug 2007	Navy Cuts Test I&M Budget to Pay Share of MSST Development Bill
Sep 2007	TRMC Submits PBD to Restore I&M Budget
Oct 2007	TRMC-Navy “FY09 T&E Budget Certification” Drill

Current Status:

- MSST Development Program On-Track, PMA-208 Adequately Funded
- Restoration of the Navy’s Major Test Range I&M Funds TBD (OSD Comptroller Action Pending)
- Congressional Requirement for Additional ASCM Target Studies TBD (Authorization Bill Conference Report Language Pending)

TRMC's Overarching Goal

"Robust and Flexible T&E Capabilities to Support the Warfighter"

T&E Threat Resource Activity
TETRA

Ken McCormick
DOT&E/TETRA
256-313-7700
UNCLASSIFIED

Outline

- Organizational Relationships
- Responsibilities
- Intelligence Support to DOT&E
- Resource Analysis Support to DOT&E
- Threat Resource Investments

TETRA = T&E Threat Resource Activity

Threat Resources include:

- **Actual Threat Hardware (Foreign Materiel)**
- **Threat Simulators including Surrogates**
- **Models of Threats**
- **Threat Simulations**
- **Hybrid Systems**

TETRA in DIA/MSIC

T&E Threat Resource Activity

"T&E Threat Resource Activity"

Command Element

Office of Director

DEFSMAC

MSN

MST

MSD

MSO

MSI

MSA

MSM

Weapon Systems Analysis

Support & Specialized Analysis

Admin Support

Relationship with DOT&E

T&E Threat Resource Activity

DIA

MOA

Hon. Charles C. McQueary
OSD / Director, Operational Test & Evaluation

Mr. Dave Duma
Principal Deputy Director

Mr. Steve Daly
Deputy Director
Land & Expeditionary Warfare

Mr. Mike Crisp
Deputy Director
Air Warfare

Mr. Bill McCarthy
Deputy Director
Net-Centric Systems

Mr. Tom Blann
Deputy Director
Naval Warfare

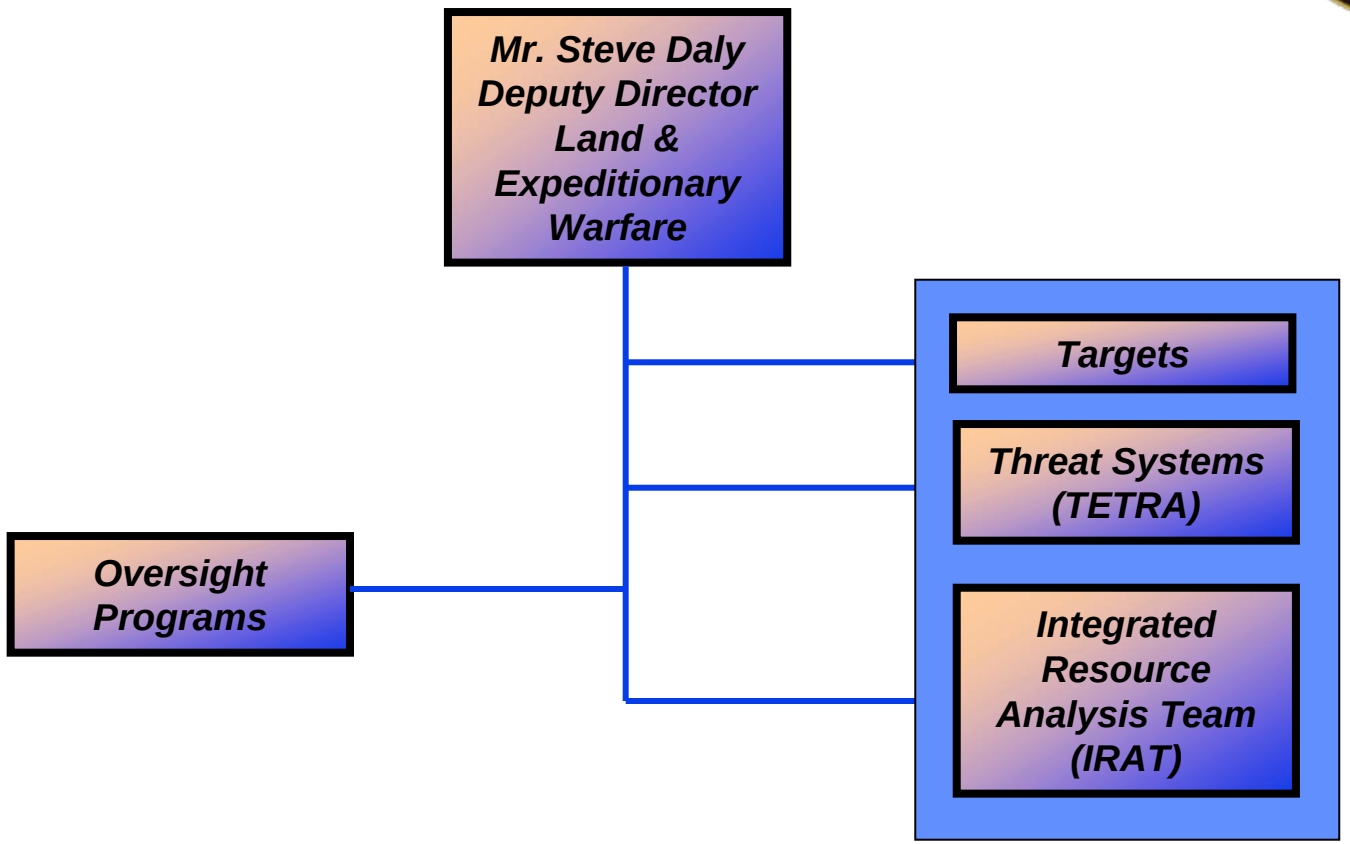
Mr. Richard Sayre
Deputy Director
Live Fire T&E

- MSIC T&E Threat Resource Activity, Huntsville, AL
- MSIC T&E Threat Resource Activity, Arlington, VA

DOT&E Oversees Operational Testing of Major Defense Acquisition Programs

Land & Expeditionary Warfare Responsibilities

T&E Threat Resource Activity



Title X Acquisition Program Oversight

Test Resources

Test Resource Relationships

T&E Threat Resource Activity

Responsible for oversight of Service Target Developments & Procurements

Targets

Manages Target Management Initiative (TMI) consisting of studies, prototypes and demonstrations to:
- **Improve Threat Realism**
- **Reduce Cost of Operations**
- **Foster Interoperability**

Threat Systems (TETRA)

Responsible for oversight of Threat Simulators, Models, Surrogates and Foreign Materiel Used in T&E

Manages the Threat Systems Program Investments to Help Satisfy Threat Test Resource Shortfalls

Provides DOT&E Action Officers with Intelligence Support

Integrated Resource Analysis Team (IRAT)

Responsible for providing independent resource analyses on a wide range of test needs in support of DOT&E including Infrastructure, personnel and policies

Coordinates Operational Test-related investments in the Resource Enhancement Project (CTEIP), TMI and Threat Systems

TETRA Organization

T&E Threat Resource Activity

Intelligence Support Team
Stef Minne

Weapon System Specific Intelligence Support
- Focal Point for Intelligence RFIs
- Formal Intel Production Support

General Intelligence Support
- Bi-Weekly Briefings to DOT&E Action Officers
- SCI Briefs to Deputies and Action Officers
- Capstone Threat Capability
- Intel Trends for IRAT/Resource Analysis

Validation Report Analysis
- Ensure data on threat assets can support accreditation decisions

Threat Resource Support Team
James “Jeb” Buck

Resource Analysis
- Oversee Service Threat Assets
- Chair the T&E Sub-Committee to the FMPSC
- Automated Joint Threat Systems HDBK
- Financial Database

Investments
- Sponsor new/improved threat asset
- development
- Lead special study efforts

Intelligence Support

T&E Threat Resource Activity

- **Provide DOT&E Action Officers with Intelligence Impacting Acquisition Program T&E**
- **Provide Bi-Weekly Intelligence Highlights Briefing at DOT&E Staff Meetings**
- **Coordinate DIA J2/J3 (Executive Support Division) SCI Briefing Topics of Interest to the Director**
- **Provide SCI Update Briefings to DOT&E Deputies and Selected Action Officers**

Provide Quick Reaction On-Site Intelligence Support to the DOT&E Staff

Validation Analysis

T&E Threat Resource Activity

- **Oversee and Conduct Technical Analysis on Service-Prepared Threat Representation Validation Reports - Including Targets**
- **Chair the Threat Representation Validation Report Review Committee and the Validation Working Group**
- **Participate in Army and Navy Threat Validation Integrated Product Teams/Working Groups**
- **Coordinate Validation Reports within DOT&E**

Validation Ensures Information on Threat Assets is Available for Informed Accreditation

Resource Analysis

T&E Threat Resource Activity

- **Provide DOT&E Action Officers with Analytical Support for Threat Adequacy Issues**
  - Identify Test Threat Capability Shortfalls
- **Oversee Army, Navy, Air Force and Marine Corps Threat Related Infrastructure**
- **Co-Chair the Test & Evaluation Subcommittee for the USD(I) Foreign Materiel Program**
- **Maintain the Joint Threat Systems Handbook**
  - Over 5,000 Threat Simulators, Targets, Models, Foreign Materiel
  - Accurate up-to-date information on Availability, Quantities, Locations, Specifications, and Validation

Foreign Materiel Program

T&E Threat Resource Activity

OUSD(I) OVERSIGHT

DIA PROGRAM MANAGER

Joint Foreign Materiel Program Committee (JFMPC)

DIA Chair
*OUSD(I). **DOT&E**, OUSD(P),Services, MDA, MSIC, NSA, SOCOM, CIA, State*

Foreign Materiel Program Steering Committee (FMPSC)

OUSD(I) Chair
*OUSD(P), OSD Comptroller, OSD Counsel, **DOT&E**, OUSD(AT&L), JCS, DIA, MDA, NSA, Services*

Foreign Materiel Exploitation Working Group (FMEWG)

OUSD(I) Chair
***DOT&E**, OUSD(P), MDA, DS&TS, DDR&E, DIA, CCM*

Test & Evaluation Subcommittee (TES)

OUSD(AT&L) & DOT&E Chair
Services, DTRA, MDA, DIA, OUSD(I)

Technology Acquisition Coordination Subcommittee (TACS)

DIA Chair
OUSD(A&T), DDR&E, OUSD(I), MSIC, Services, CIA, MDA, NSA,ARPA, SOCOM

Authority
DoD Directive C-3325.1
19 FEB 1998
DoD Instruction S-3325.4
15 APR 1999

Automated Joint Threat Systems Handbook (AJTSH)

T&E Threat Resource Activity

- **A Comprehensive Reference of the Current DoD Threat Resource Inventory**
  - Threat Simulators
  - Targets
  - Foreign Materiel
  - Digital Threat Models

- **Supports Test Planners With Accurate and Up to Date Information**
  - Availability
  - Quantities
  - Locations
  - Performance Parameters / Specifications

Focused Investments

- **Fund Studies/Developments for Threat Realistic T&E Environment**
  - Threat Design Studies
  - Threat Intelligence Data Analysis and Test Methodology Studies Leading to Hardware / Software Development
  - Threat Simulators
    - Digital Threat Models
    - Threat Surrogates
    - Foreign Materiel Hardware
- **DOT&E-funded Threat Simulator Investments**
  - $4 - $4.5M/Year
- **TRMC-funded Threat Simulator Investments**
  - $2.5 - 3.5M/Year

Threat Systems Investment Process

T&E Threat Resource Activity

Develop Focus Areas	Solicit Proposals & Screen	Evaluate & Select	Fund
AOs IRAT IDA Strategic Plan Working Groups Services	Threat Systems Staff IRAT TRMC Services	AOs IRAT Threat Systems Staff Services DOT&E Selects	DOT&E TRMC

FY08 Investment Focus Areas

T&E Threat Resource Activity

- Testing Against Advanced SAM Threats
- Development/Fielding of Chinese Threat Test Assets
- Develop, Integrate and Validate Standard Missile Fly Out Models (FOMs) for T&E
- SA-2/3/6 Upgrades
- How to Conduct Low Band Testing
- IR Signature Collection – Post Burn-Out (PBO)
- Other Threat M&S
- Distributed Testing with Threat Assets
- New T-SPIL Developments
- TENA Compliant Instrumentation Packages for Threat Systems

Testing Against Advanced SAM Threats

T&E Threat Resource Activity

- Newer SAM Threats are Being Developed
- Very Capable, Sophisticated Integrated Systems
- Foreign Materiel Purchases Not Probable in the Short Term (<10 Years)
- Major "Limitation of Test" for New Weapon Systems
- TETRA initiative – Conduct Pre-ITEAMS for Advanced Russian and Chinese Air Defense Systems
  - S-400 Concludes in Dec 2007 & has an Additional $4M FY08 Congressional Earmark to Complete the Design
  - HQ-9 begun This Past Summer
  - High Fidelity System Model and Hardware Design to Support M&S, HITL, ISTF or OAR Testing

ITEAMS = Integrated Technical Evaluation and Analysis of Multiple Sources
HITL = Hardware-in-the-Loop
ISTF = Installed System Test Facility
OAR = Open Air Range

Chinese Threat Test Assets

T&E Threat Resource Activity

- **Department has Very Limited Inventory of Chinese Threat Assets**
- **Chinese Threat Assets Pose Continuous "Limitation of Test" Situations**
- **China Represents a Potential Adversary and has a Robust Foreign Military Sales Program**
  - **Pakistan and Iran are Major Customers**
- **TETRA sponsored a Threat Modernization Effort to See How We Could Use or Modify Existing Equipment, or Buy Chinese Threat Representations**

FOM Problem in T&E

- **Electronic Warfare Testing Methodology Requires Correlation Across T&E Facilities Including**
  - Software-in-the-Loop Facilities
  - Hardware-in-the-Loop Facilities
  - Installed Systems Test Facilities
  - Open Air Ranges
- **Most Legacy Models Not Authoritative, Not Validated**
  - Results Can Not Be Correlated
  - Same Threat, Different Model Gives Different Answers and is Expensive to Maintain

TETRA Initiative:
Develop a Roadmap to Migrate DIA-Validated FOMs to All T&E Facilities

Roadmap for T&E FOM Integration

T&E Threat Resource Activity

- **Sponsored Pilot Projects to Determine Feasibility**
  - Demonstrated IR MANPADS
  - Demonstrated RF SAMS
- **TETRA Established a Collaborative DOT&E/Service Relationship**
- **Beginning FY08 – 4 Year Effort**

  TETRA will Fund Integration of *All* IR FOMs

  TETRA Sponsored TRMC-Funding of *All* RF FOMs
- **TETRA is also Working Service Sustainment**

TETRA Bridged the Intelligence Community Threat Models with Test & Evaluation Facilities

SA-2/3/6 Upgrades

T&E Threat Resource Activity

- SA-2/3/6 Appear All Around the World
- Russia has On-Going Programs to Modify or Upgrade these Weapon Systems
- Some Upgrades Pose Credible Threats to Our Aircraft
- TETRA's Current Initiative to Work with the Services to Determine
  - Specific Test Requirements for these Modified Systems
  - Availability of Upgrades from Original Manufactures
  - Alternatives If the Upgrades are Not Available

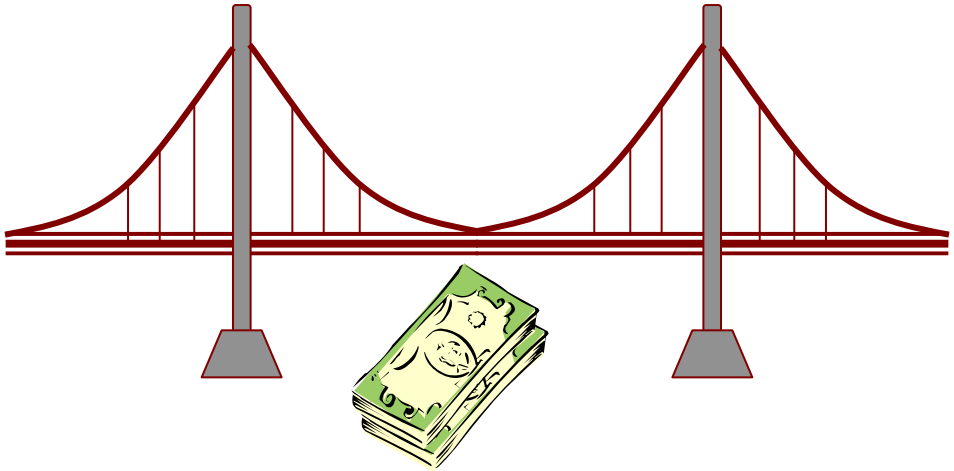
Mission

T&E Threat Resource Activity

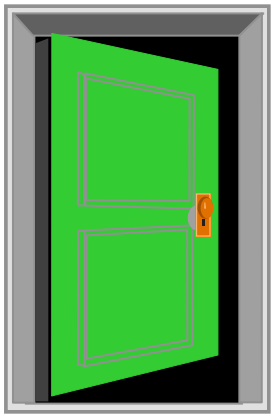
T&E Community

"Threat Resource" Bridge Between the T&E and Intelligence Communities

TETRA



Intelligence Community



United States Air Force

Air Force Aerial Targets
October 2007
NDIA Brief
San Diego, CA

Ms. Michele Brazel
Director, 691st Armament Systems Squadron
Eglin AFB, FL

Overview

- **Purpose**
- **System Description**
- **Organizational Structure**
- **Product Groups**
  - **Full-scale Aerial Targets**
  - **Subscale Aerial Targets**
- **Summary**

Purpose

- **Provide "Presentations" of Realistic Threat Representative Systems (Aircraft and Cruise Missiles) in Support of the Following:**
  - **Lethality Testing Required for New or Improved Weapon Systems Prior to Production (10 USC 2366)**
  - **USAF Air-to-Air Weapon System Evaluation Program**
- **Validate Performance Of DoD Ground-to-Air and Air-to-Air Missiles and Aircraft Systems**
  - **Emulates Performance, Signatures and Countermeasures (Infrared and Electronic Attack)**

Overview

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- Summary

System Description

- **Aerial Target "Presentations" include:**
  - **The Target Itself**
  - **Target Control System**
    - **Gulf Range Drone Control System (GRDCS)**
  - **Launch, Recovery, Maintenance & Repair of Target**

Overview

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- Summary

691st Armament Systems Squadron

691 ARSS

DIRECTOR

Ms. Michele Brazel

DEPUTY DIRECTOR

Ms. Audrea Feist

CONTRACTING

Ms. Leanne Green

FINANCE

Ms. Jo-An Williams

CHIEF ENGINEER

Mr. Charlie Reuter

AFSAT

Mr. Jim Cornwell

QF-4

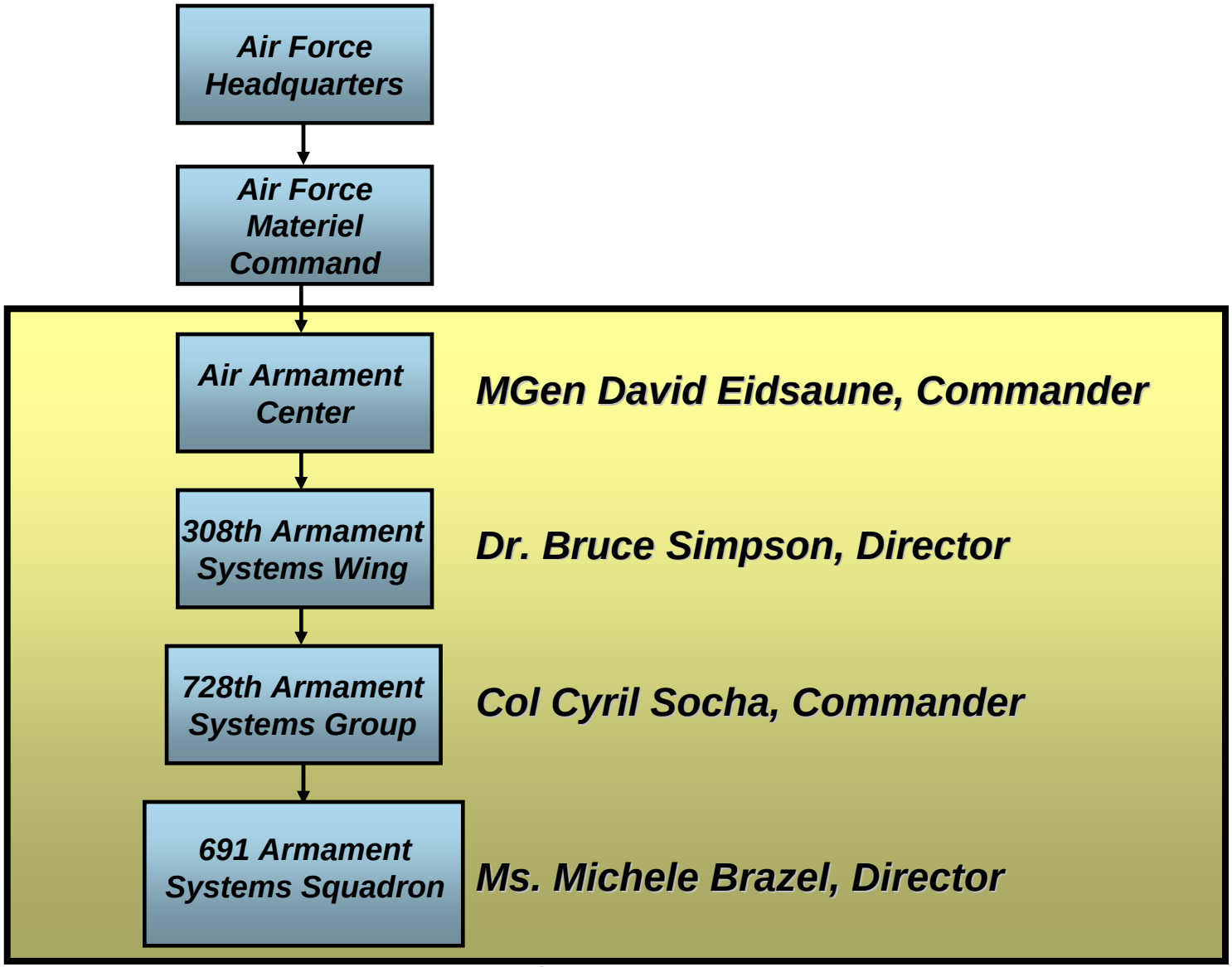
Ms. Lee Neugin

QF-16

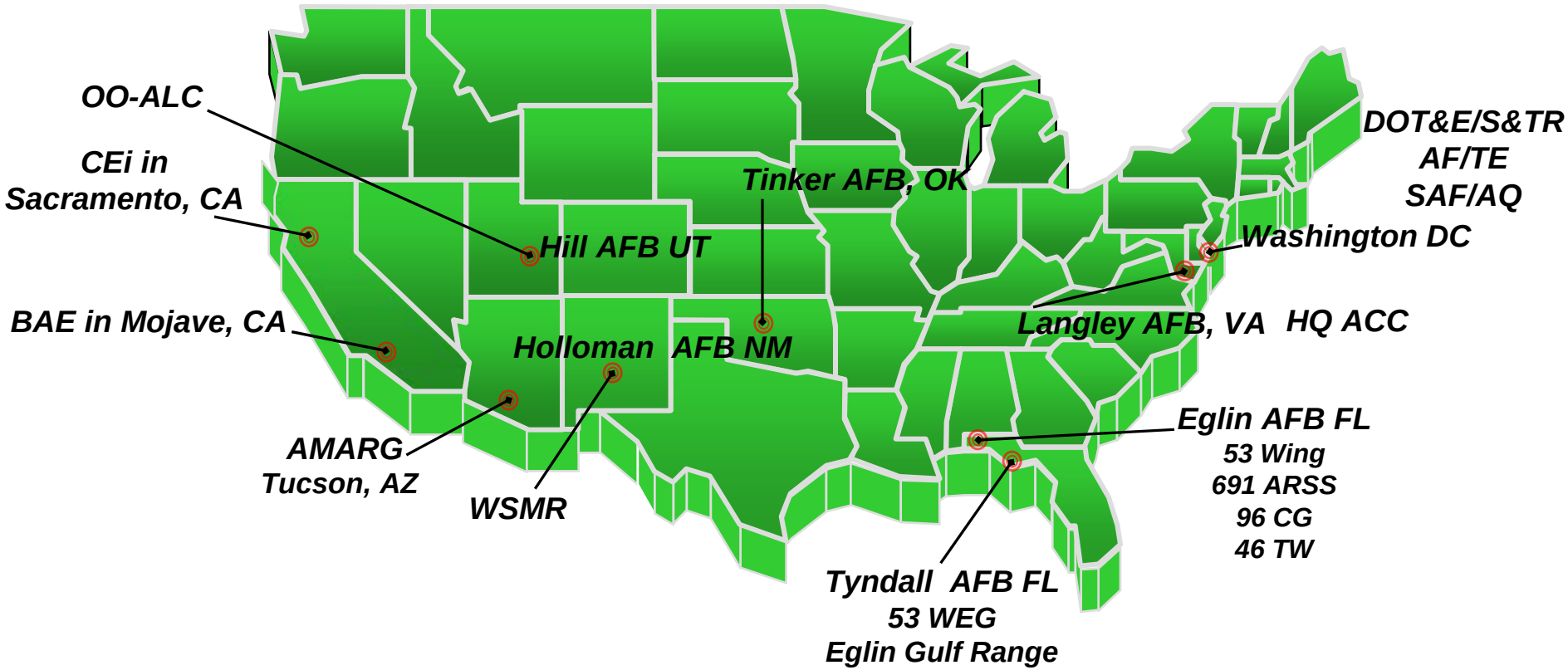
Mr. Ken Hislop

Develop, Procure and Sustain Aerial Targets and Related Systems

Where We Fit In



USAF Aerial Targets Stakeholders



Click Middle of Screen to Start Movie

Overview

- Purpose
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  - Subscale Aerial Targets
- Summary

QF-4 Full Scale Aerial Target

Program Manager: Ms. Lee A. Neugin

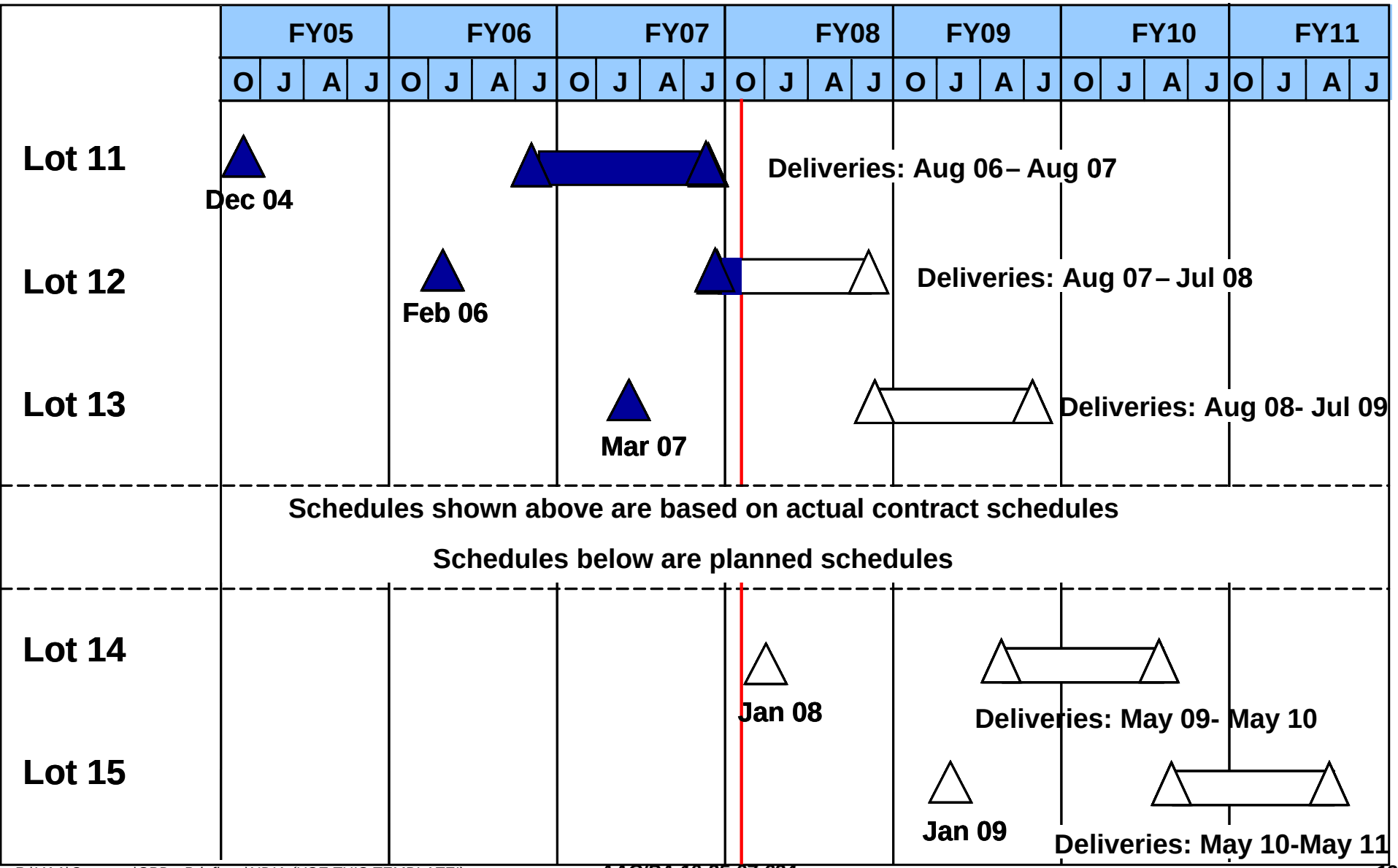
Description

- **Full Scale Aerial Target for Threat-Representative Weapon System Evaluation**
- **Meets USAF, Army, Navy, Allied Test Requirements**
- **Droned Refurbished F-4 Aircraft Out of AMARG**
- **Program in Full Rate Production**
- **Prime Contractor is BAE Systems, Mojave, CA**

Key Features

- **Satisfies Title 10 "Live Fire/Lethality"**
- **Operates via Ground-Based Target Control System**
- **Supersonic, High-G, Heavy Payload Capability**
- **Provides 3rd Generation Threat Representation**

QF-4 Master Schedule



QF-4 2007 Accomplishments

- **Completed Lot 11 and Began Lot 12 Deliveries**
  - **Total of 226 QF-4s Delivered to Date**
- **Conducting Government Ground Test of QRF-4C Model**
  - **Provides Three Additional Years Of Fullscale Capability**
  - **Projecting 17 Production Lots vice Current 15 Lots**
- **Supported 42 NULLO Test Missions in FY07**
  - **61 Missiles Fired**
  - **8 Kills**

The Future of QF-4

- **Lots 14 – 17 Will Consist of RF-4C Models Only**
- **Last QF-4 Delivery Planned For FY13**
- **Sufficient Inventory through FY15**
  - **Assumes 16 – 20 QF-4 Kills Per Year**
  - **Bridges Ops Capability Until QF-16 Deliveries**

QF-16 Air Superiority Target

Program Manager: Mr. Ken Hislop

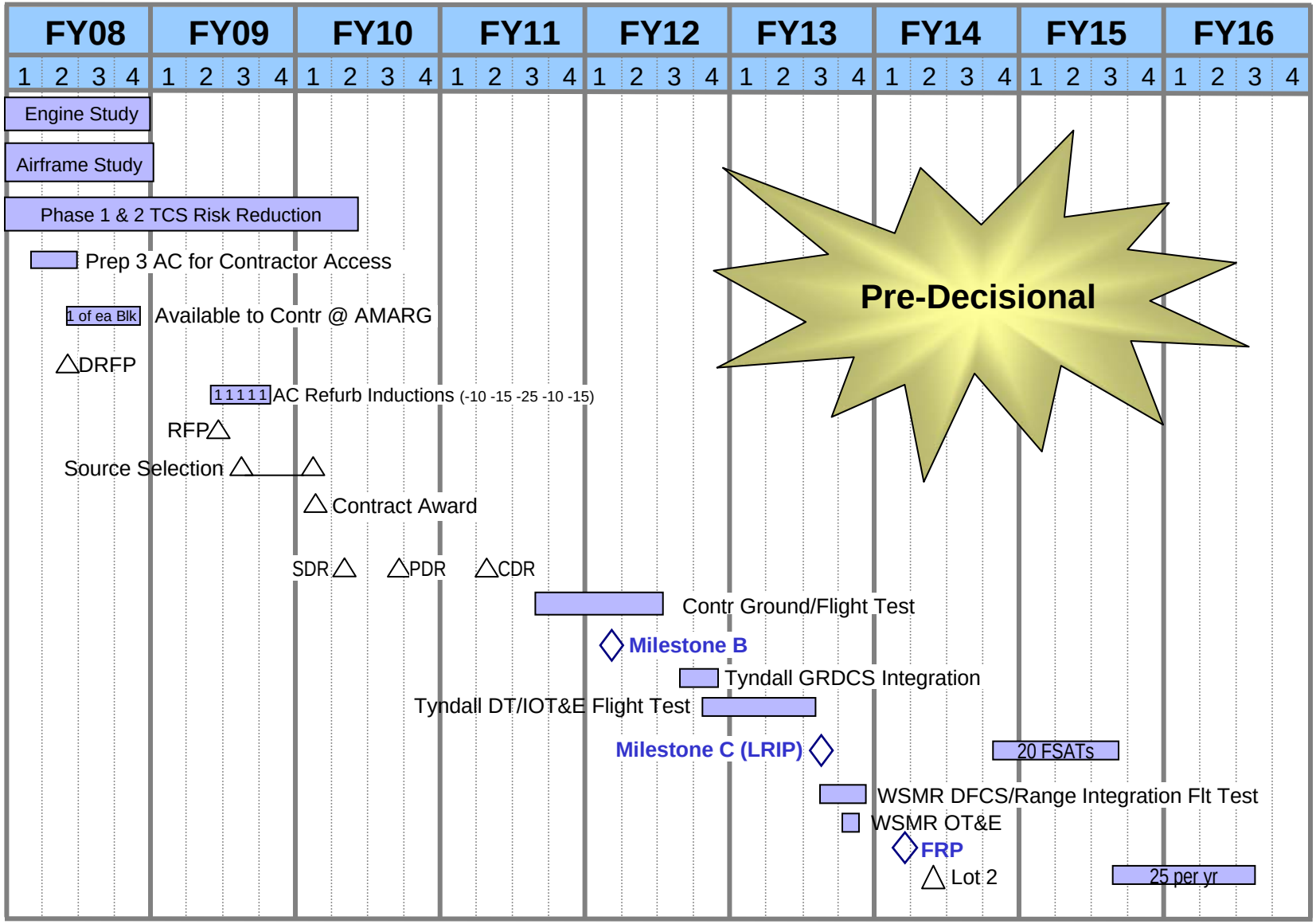
Description

- **Fullscale Target for Threat-Representative Weapon System Evaluation**
- **Meets USAF, Army, Navy, Allied Test Requirements**
- **Program in Pre-System Development and Demonstration Phase**
- **Droned Refurbished F-16 Aircraft**
- **Risk Reduction in Progress: Airframes, Engines & Target Control System**

Key Features

- **Follow on for QF-4 Program: Supersonic, High-G, Heavy Payload Capability**
- **Satisfies Title 10 "Live Fire/Lethality"**
- **Provides 4th Generation Threat Representation**

Proposed QF-16 Schedule FY08-FY16



QF-16 Risk Reduction

- **Risk Reduction Activities: FY07 - 09**
  - **Focus on Government Furnished Equipment**
- **F-16 Airframe Study**
  - **Assess Condition and Availability of Block 10, 15, and 25s**
  - **Cost of Refurbishment**
- **Engine Study**
  - **OSS&E Impacts to Manned and Unmanned Capability**
  - **Assesses Multiple F100 Engine Configurations**
- **Target Control System (TCS)**
  - **Data Link Tester Development**
    - **Integrate Ground S/W with Contractor-Developed Airborne S/W**
  - **Portable TCS For Contractor Development Support**

F-16 Aircraft Survey

- **Provide Potential Primes Access to Airframes**
  - **Three F-16s Available at AMARG in Late FY08**
    - **Blocks 10, 15 and 25**
  - **Government Crew Chief Supervises Visits**
  - **Program Office Set Ups Visitation Schedule**
  - **Aircraft Will Be On Ground Power For Analysis**
  - **Gun and Ammo Canister Will Be Removed**
- **Multiple Visits May Be Permitted**

Better Understanding of Aircraft ⇨ ***High Confidence Proposals***

QF-16 AST Status

- **FY09 PBR Funding Approved**
  - **Air Force and Navy Funded**
- **1st Industry Day Complete**
  - **63 Industry Attendees Representing 23 Companies**
- **Draft RFP Due Out in Mar 08**
  - **Key Focus For Industry Day II**
- **2nd Industry Day Planned 3QFY08**
  - **Increase Use of One-on-One Sessions**
- **RFP Release in 2QFY09**
- **Contract Award in 1QFY10**

Acquisition Strategy not yet Approved – Information Regarding Future Events / Strategy is Tentative

Overview

- Purpose
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- Organizational Structure
- Product Groups
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AFSAT Sub Scale Aerial Target

Program Manager: Mr. Jim Cornwell

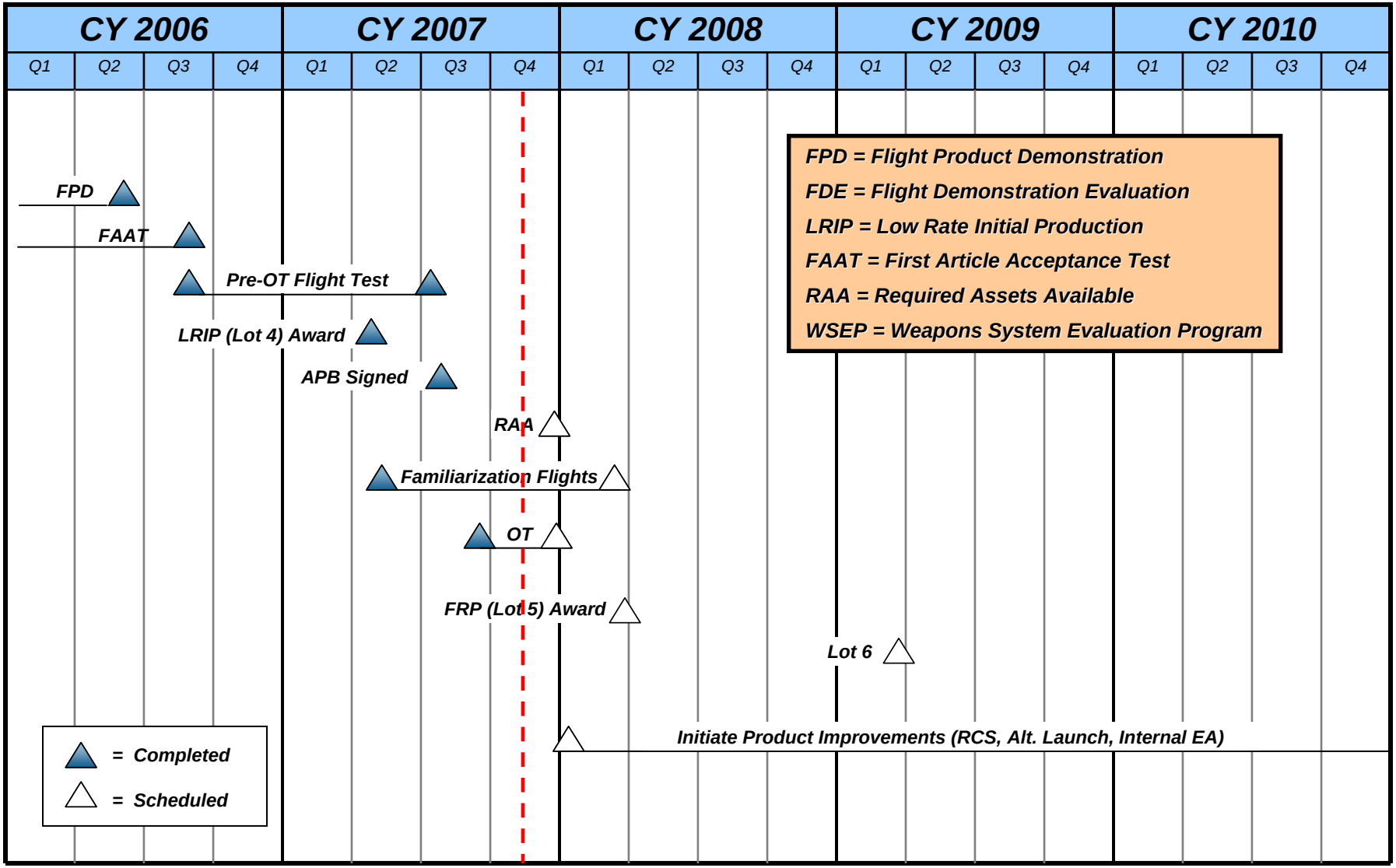
Description

- **An Affordable, All-Composite Airframe**
- **Flies Faster/Slower, Higher/Lower, and Provides 3x+ More Presentations Than Legacy USAF Subscale Targets**
- **Program in Initial Production Phase**
- **Prime Contractor is CEi, Sacramento, CA**

Key Features

- **Satisfies Title 10 "Live Fire/Lethality"**
- **Operates via Ground Based Target Control System**
- **Subsonic, Relatively Heavy Payload Capability**

AFSAT Master Schedule



AFSAT 2007 Accomplishments

- **Completed Pre-Operational Testing**
- **Supported 21 Familiarization/Weapon System Evaluation Program Missions**
  - **114 Presentations Achieved with 103 Missiles Fired**
  - **5 Kills**
- **Currently in Operational Testing**
  - **Estimate Completion by Nov 07**
- **Full Rate Production Decision Planned NLT Mar 08**

Overview

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Summary

- QF-4 Production Planned Through FY13 Using RF-4C Model
  - Inventory Depletion Expected in FY15
- QF-16 Strategy Underway
  - Draft Request for Proposal (RFP) Planned 2QFY08
  - Production Deliveries Planned to Begin in FY15
- AFSAT OT Testing Complete / Awaiting OT Final Report
  - Next Step to Execute Lot 5 Award 2QFY08

NORTHROP GRUMMAN

DEFINING THE FUTURE

Unmanned Aircraft Systems Supporting Battlefield Troops Past, Present, and in the Future

NDIA Targets, UAVs and Range Operations Symposium 2007

October 31, 2007

John Salafia
Director, Aerial Target Programs, Unmanned Systems
Northrop Grumman Corporation

POWAY, CALIF.
Firefighter Jason Peterski attempts to keep a wall of flame from engulfing a house on Scout Hill Road Oct. 22

FIRESTORM

Fanned by fierce winds, the worst Californ res in memory lay waste to vast swaths of l displace nearly a mi ion people

Kristina Ford (right) and neighbor Ivan Hayes watches Ford's home is threatened by flames in Poway.

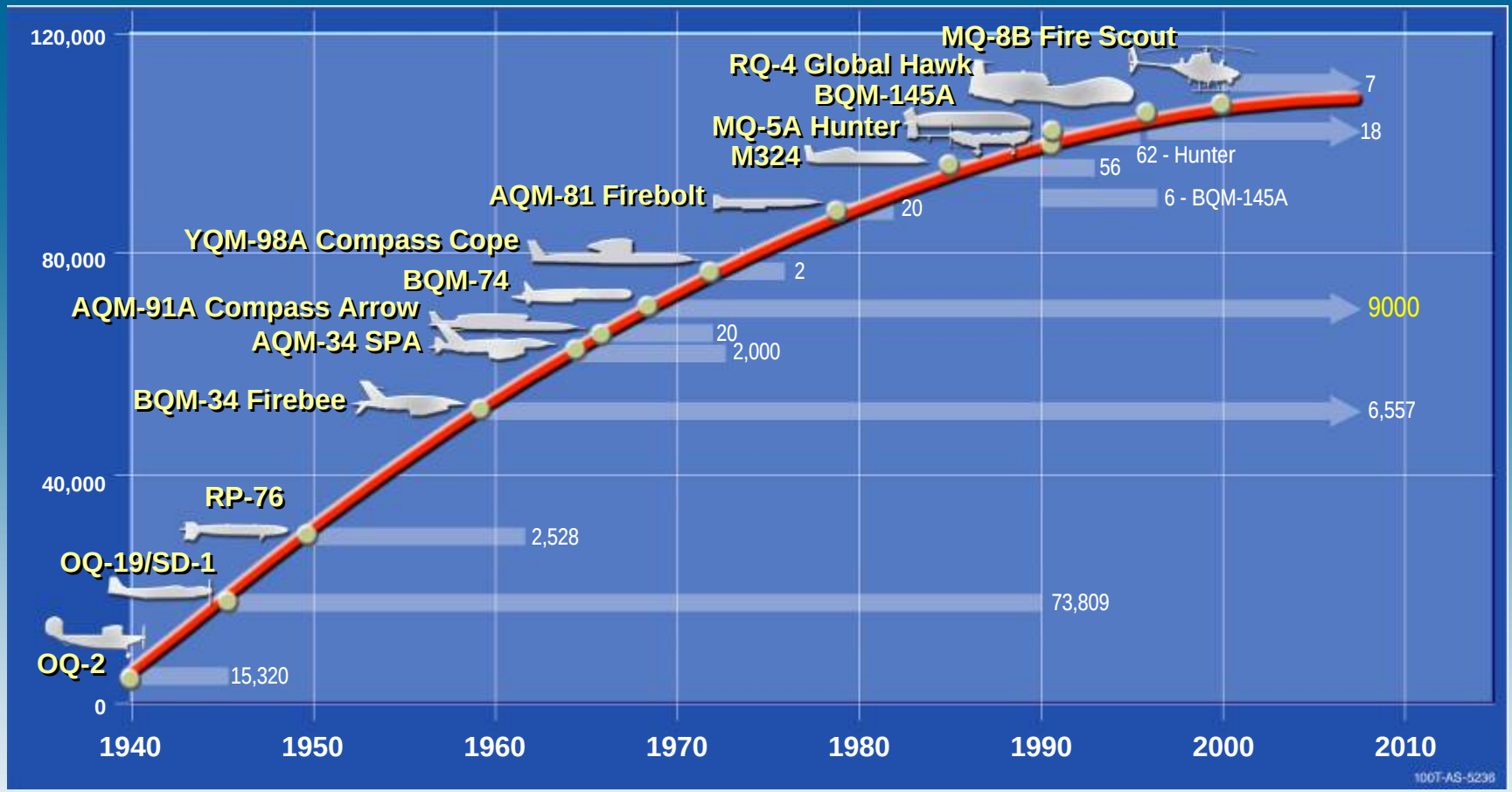
Last Century Saw Many Revolutions…

Capability Developments for the Future are Built Upon a Legacy of Unmanned Aerial Systems

Unmanned. Unmatched.

NORTHROP GRUMMAN
DEFINING THE FUTURE™

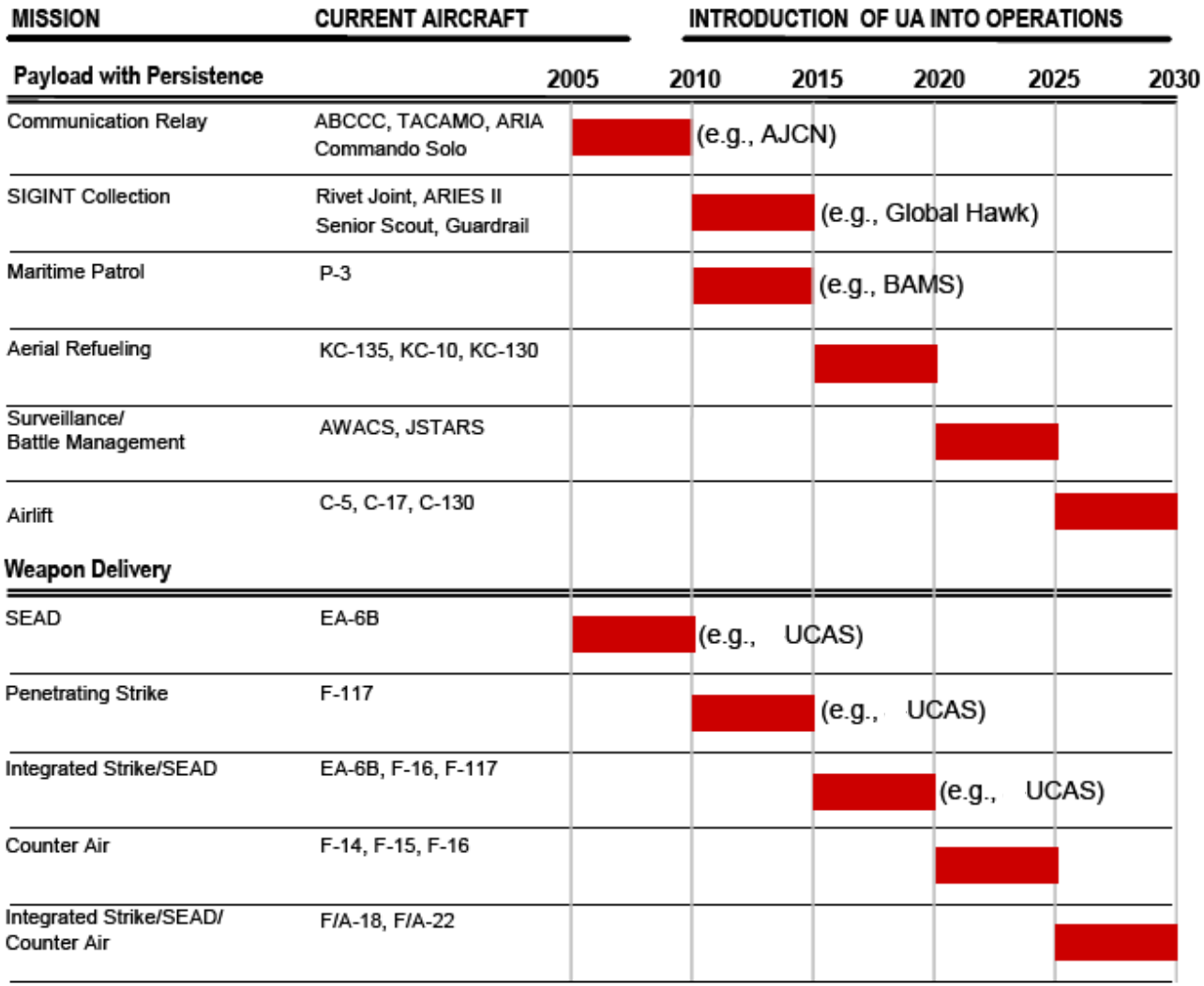
Unmanned Systems Across All Mission Areas



>100,000 Unmanned Vehicles Delivered

A Solid Future for Unmanned Missions

- Very long endurance without physiological issues
- Very high altitude without pressurization and oxygen
- Sustained ultra high-G combat operations
- Penetration of hostile territory without crew risk



Source: OSD UAS Roadmap 2005-2030 (04August2005)

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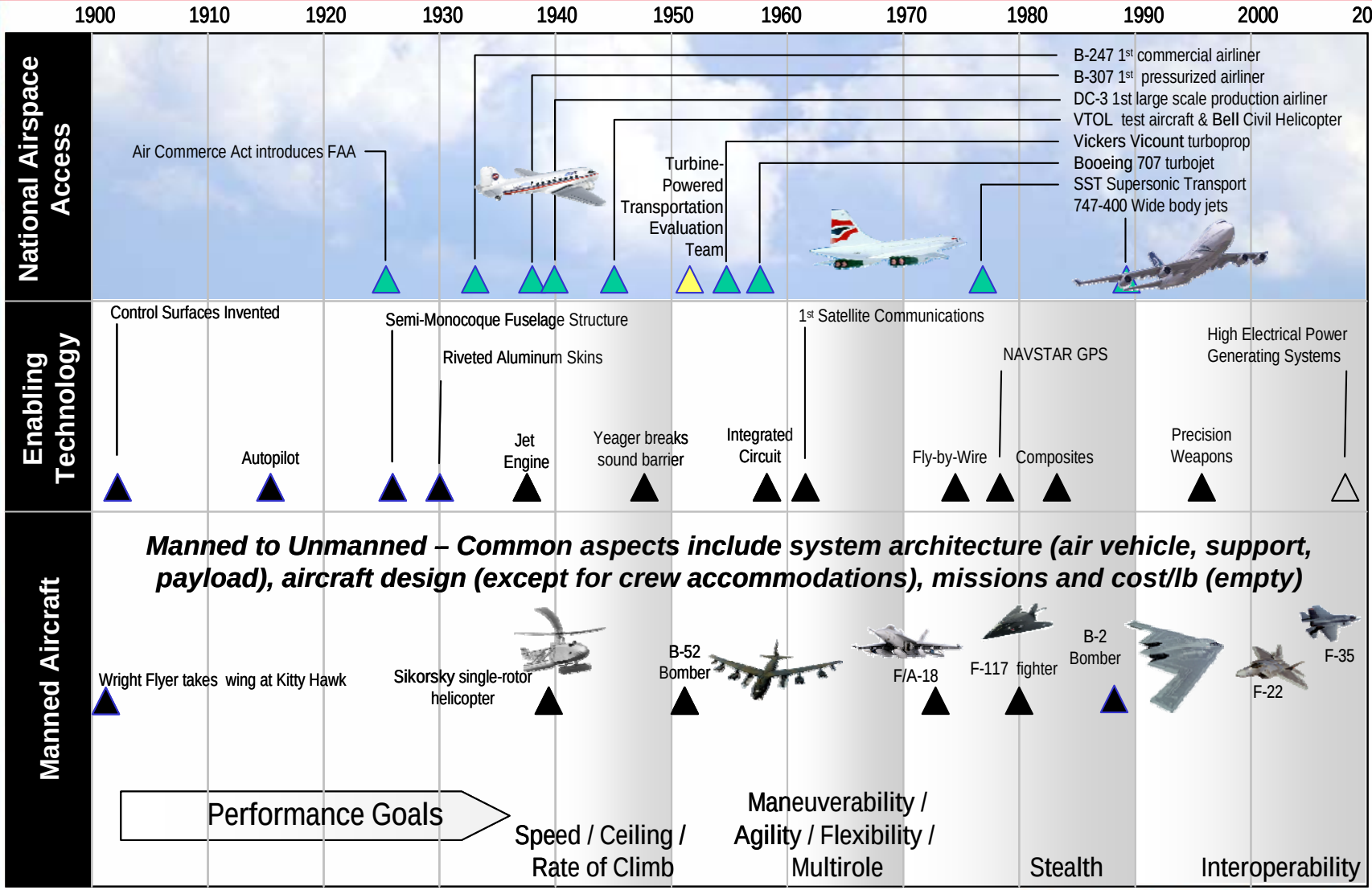
Building Upon Where We Have Been



NORTHROP GRUMMAN

Series 147 “SPAs” in Southeast Asia

1965-1972

3,435 Combat Sorties

NORTHROP GRUMMAN

More Recent Warfighter Support…

NORTHROP GRUMMAN

New Age of the UAV... 1972 - 2007

Supporting Battlefield Troops Today

Reservists in Nevada analyze sensor data

Mission control integrated with DCGS at Beale AFB

Tight coupling with strike aircraft for TCT

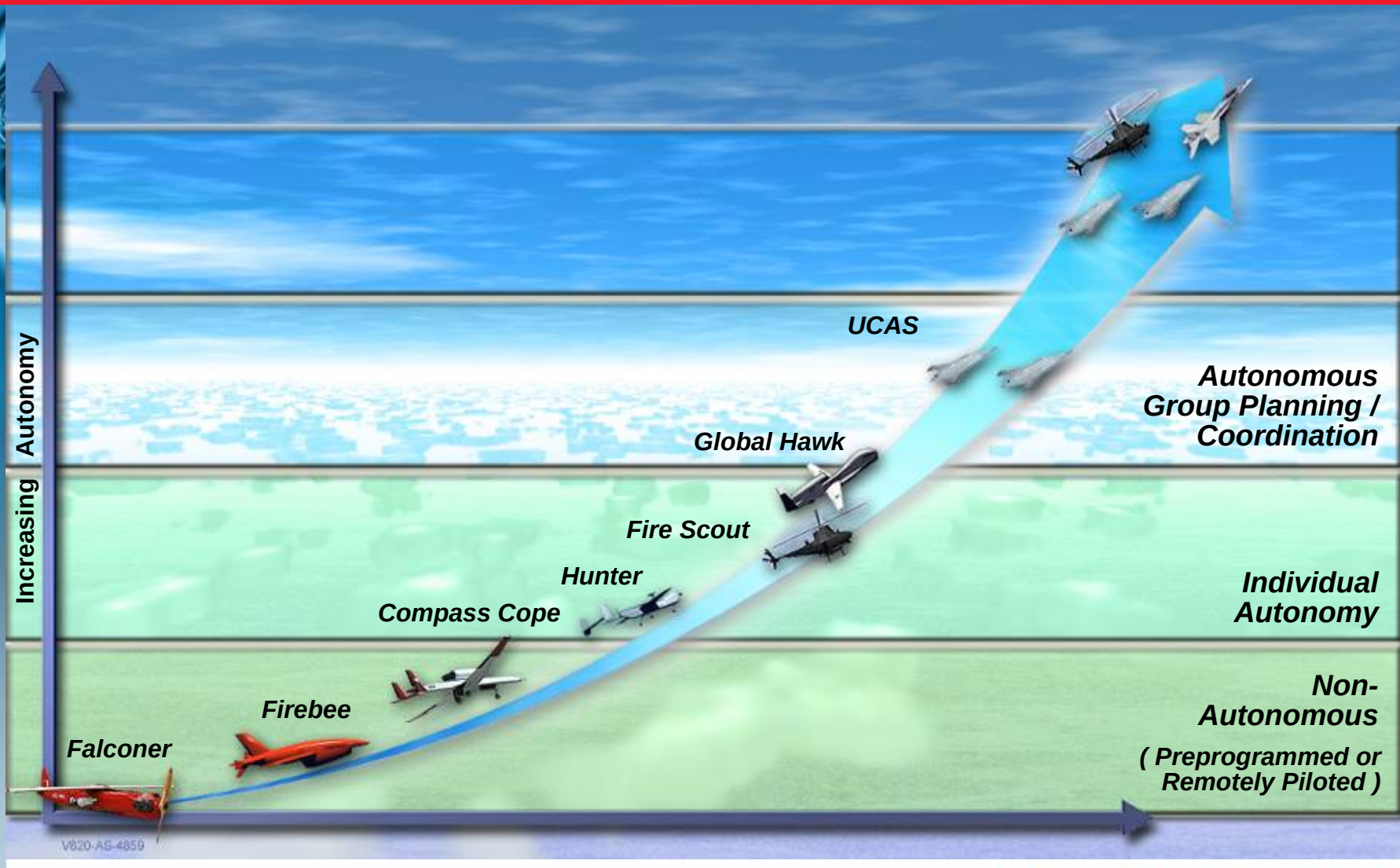
Global Hawk operates from air base with manned aircraft

Commanders in the Middle East coordinate via internet chat with mission controllers and imagery analysts

Other UAVs In Theater

Existing comm links provide two-way data to many types of users

Autonomy



Carrier Compatibility

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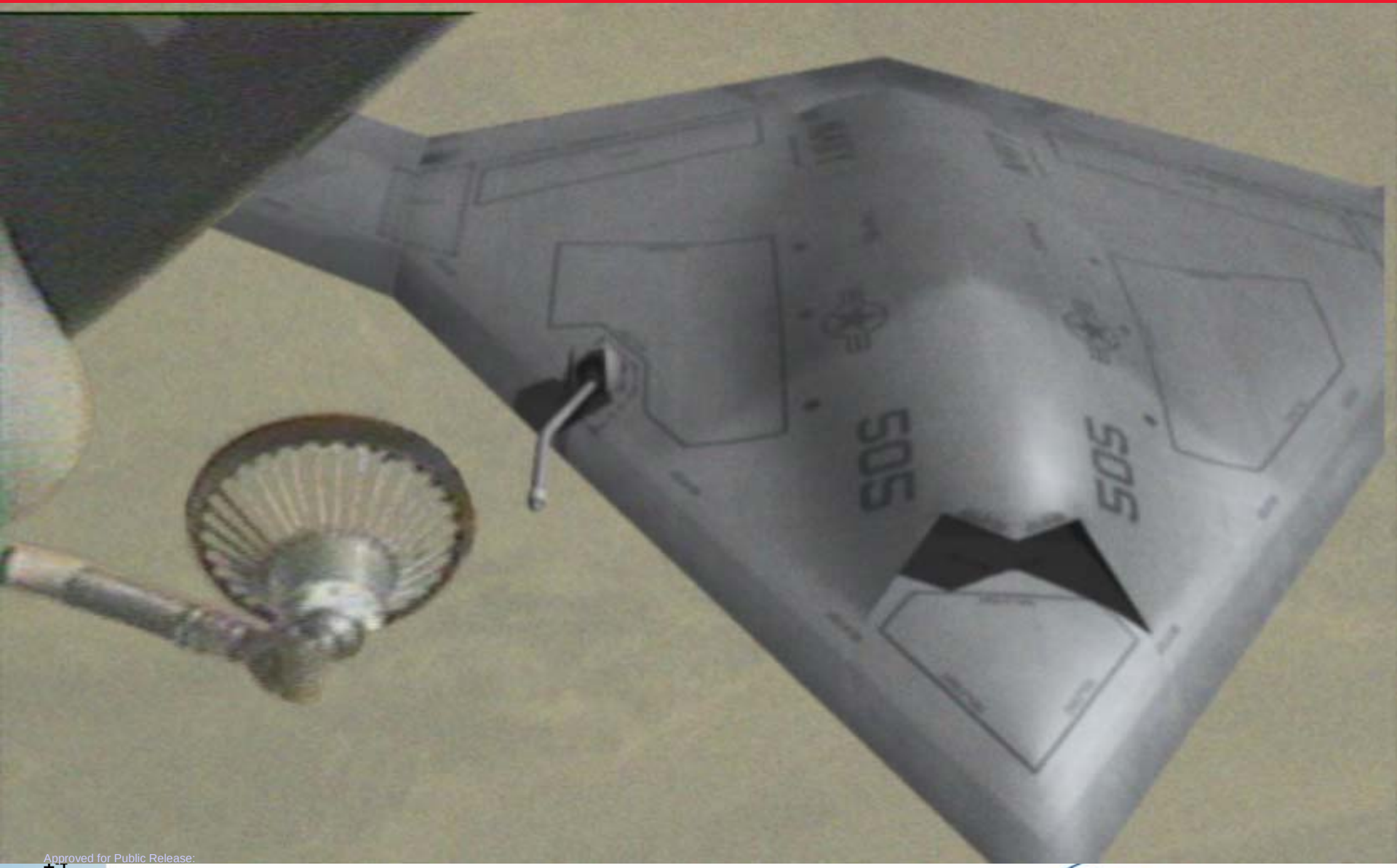
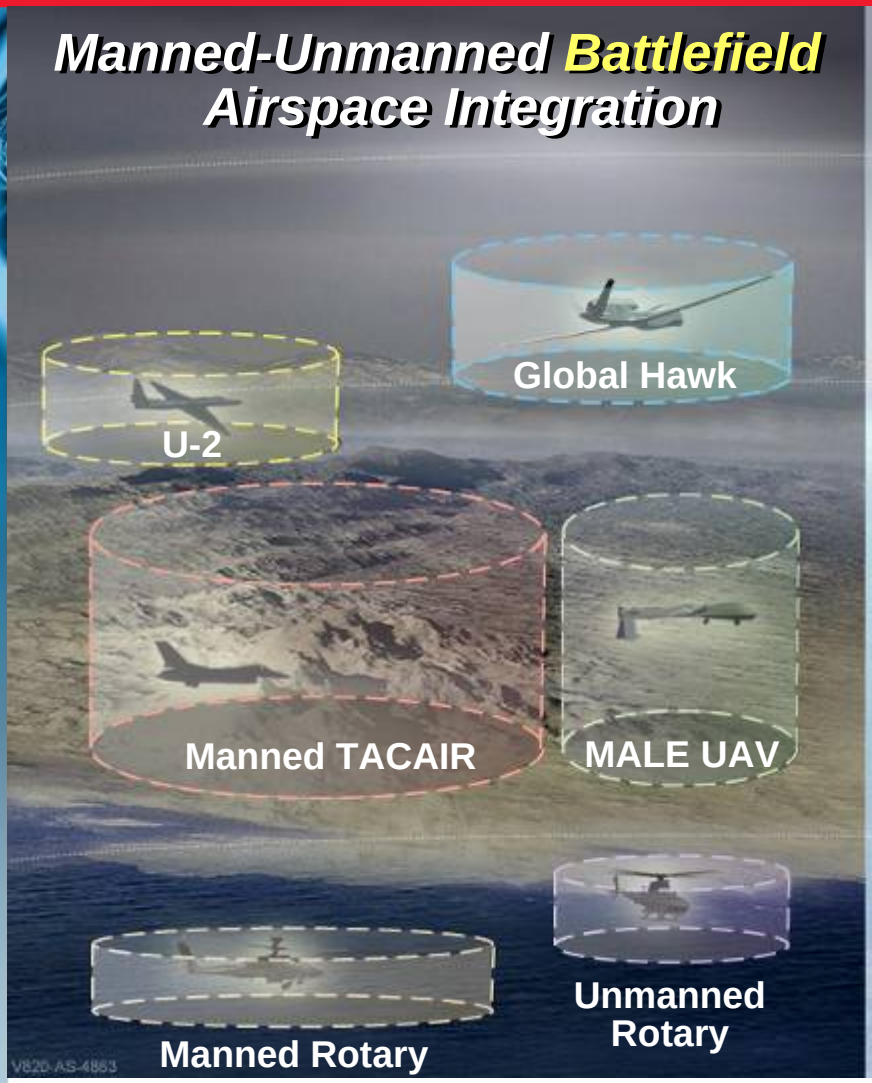
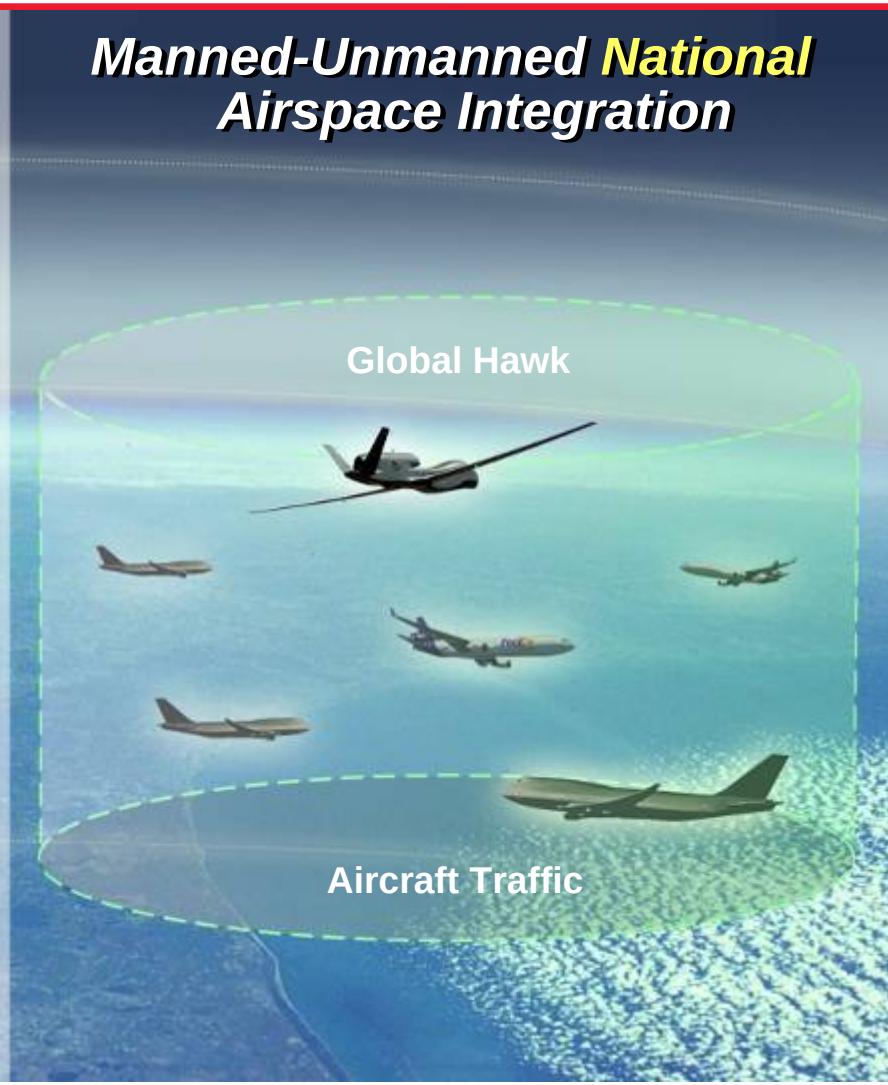
Aerial Refueling of Unmanned Aircraft: The Ultimate in Endurance



Airspace Integration – A Key Enabler of the Unmanned Revolution

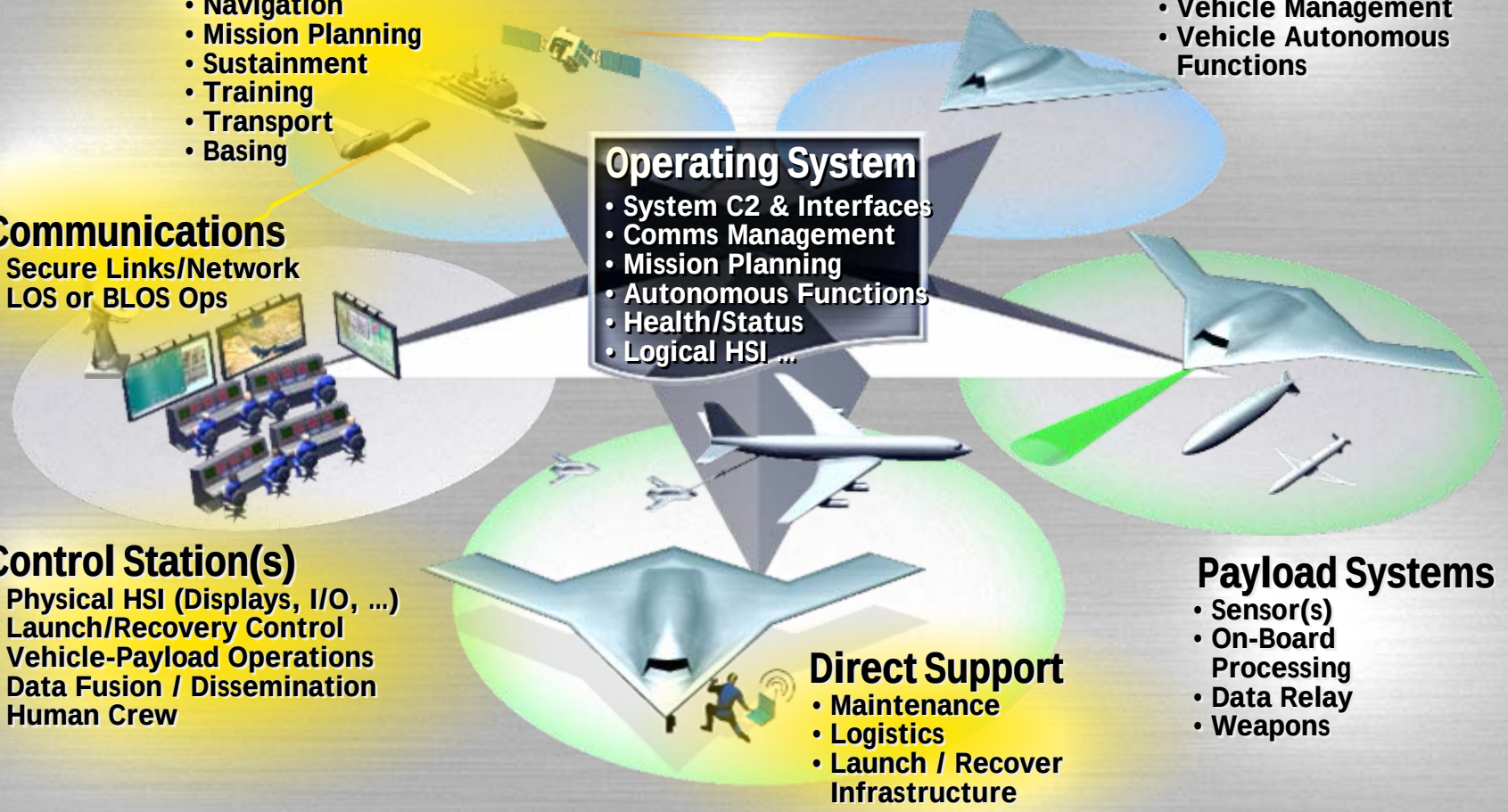




Battlefield Homeland

NORTHROP GRUMMAN

Benefits of Interoperability



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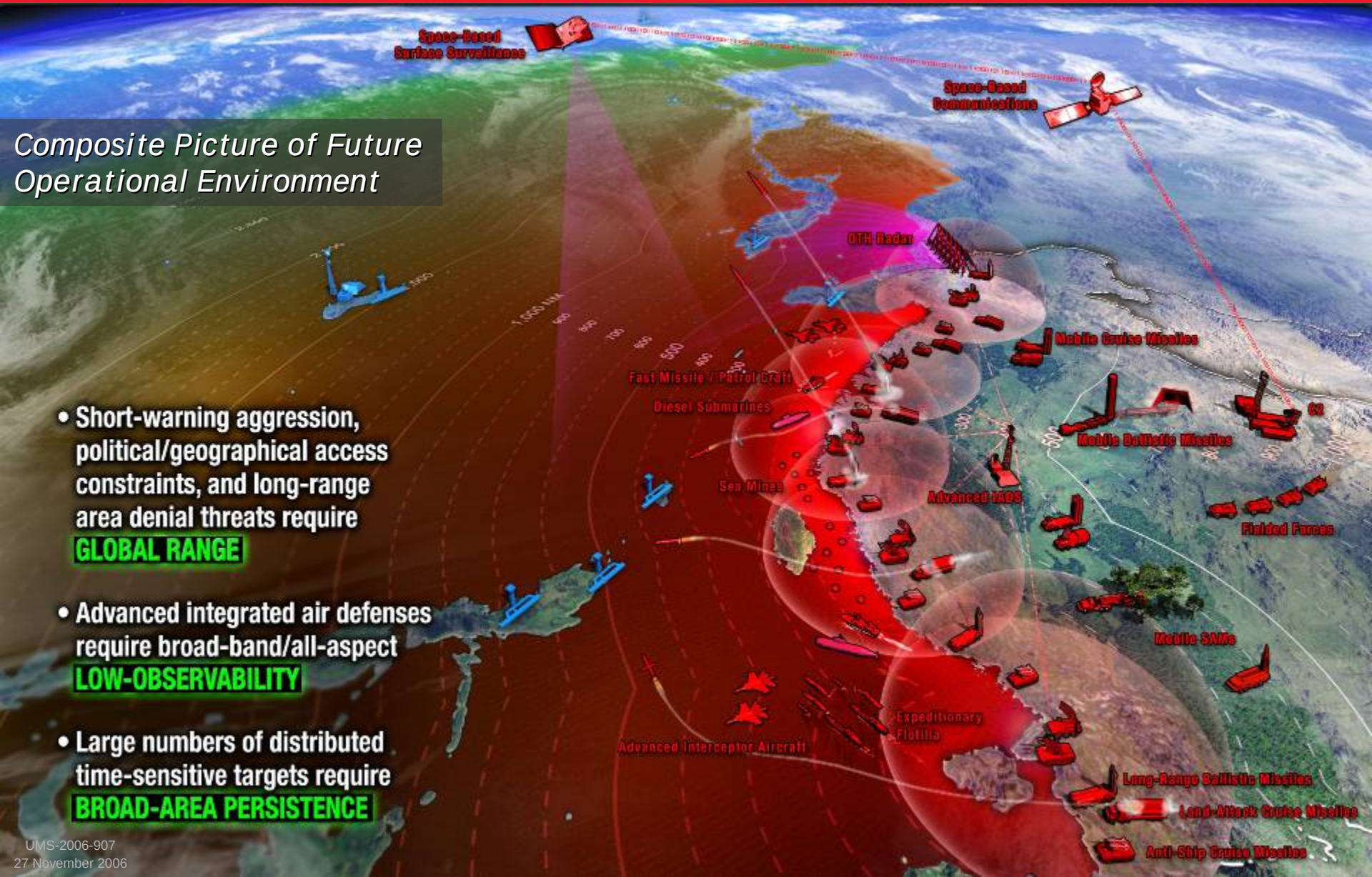
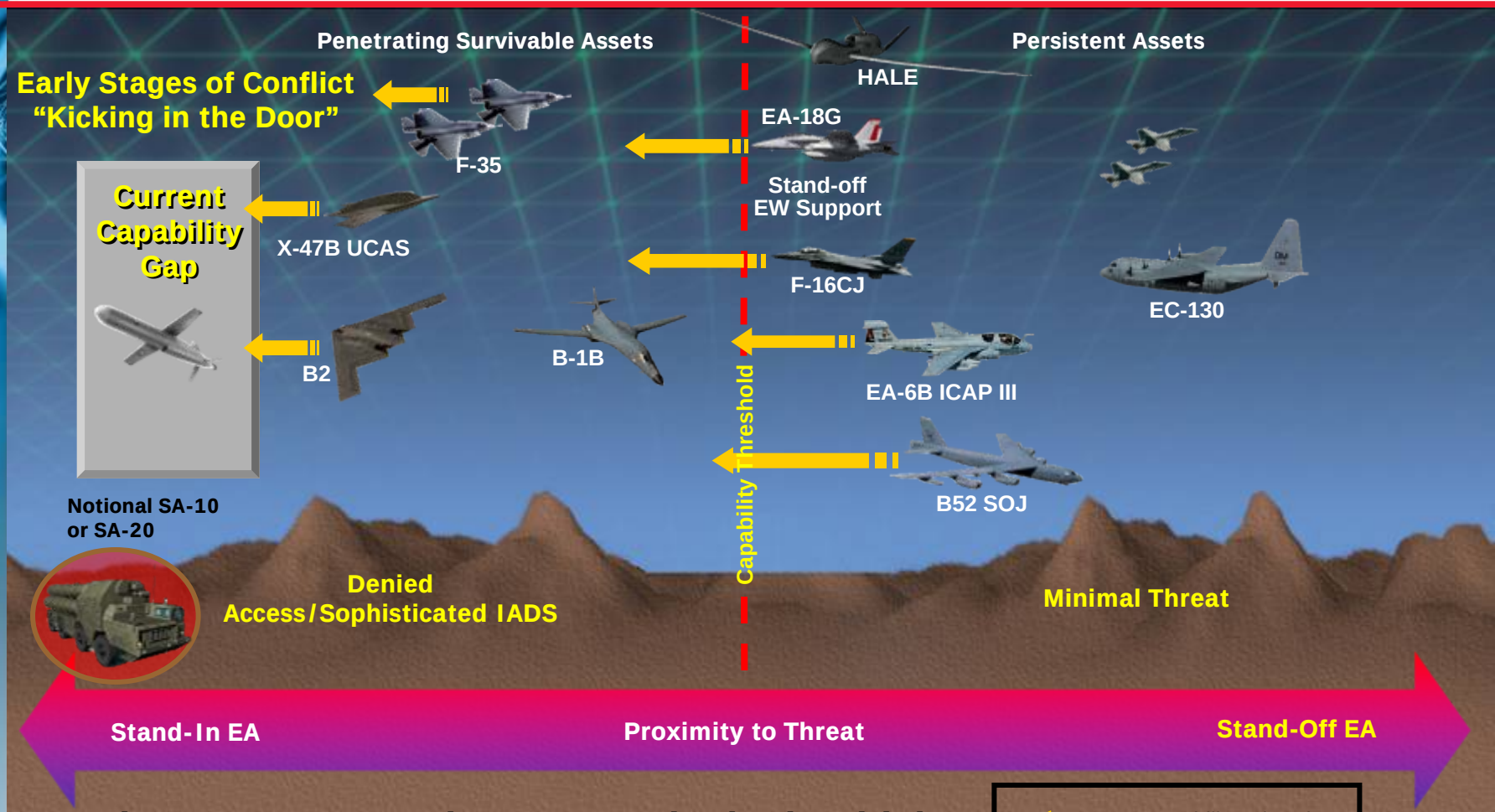
Emerging Power Projection Challenges Demand An Unprecedented Combination of Attributes



Composite Picture of Future Operational Environment

- Short-warning aggression, political/geographical access constraints, and long-range area denial threats require **GLOBAL RANGE**
- Advanced integrated air defenses require broad-band/all-aspect **LOW-OBSERVABILITY**
- Large numbers of distributed time-sensitive targets require **BROAD-AREA PERSISTENCE**

Notional EW Capability in High Threat Environments



Trade Space: Saturation EA vs Cloaked Vehicle

Capability Migration

- Defined by Current Inventory of Aircraft
- Must Combine both Saturation and low RCS and utilize vehicles capable of stand-in EA
- Passive & Direct Techniques to dull /deceive/confuse

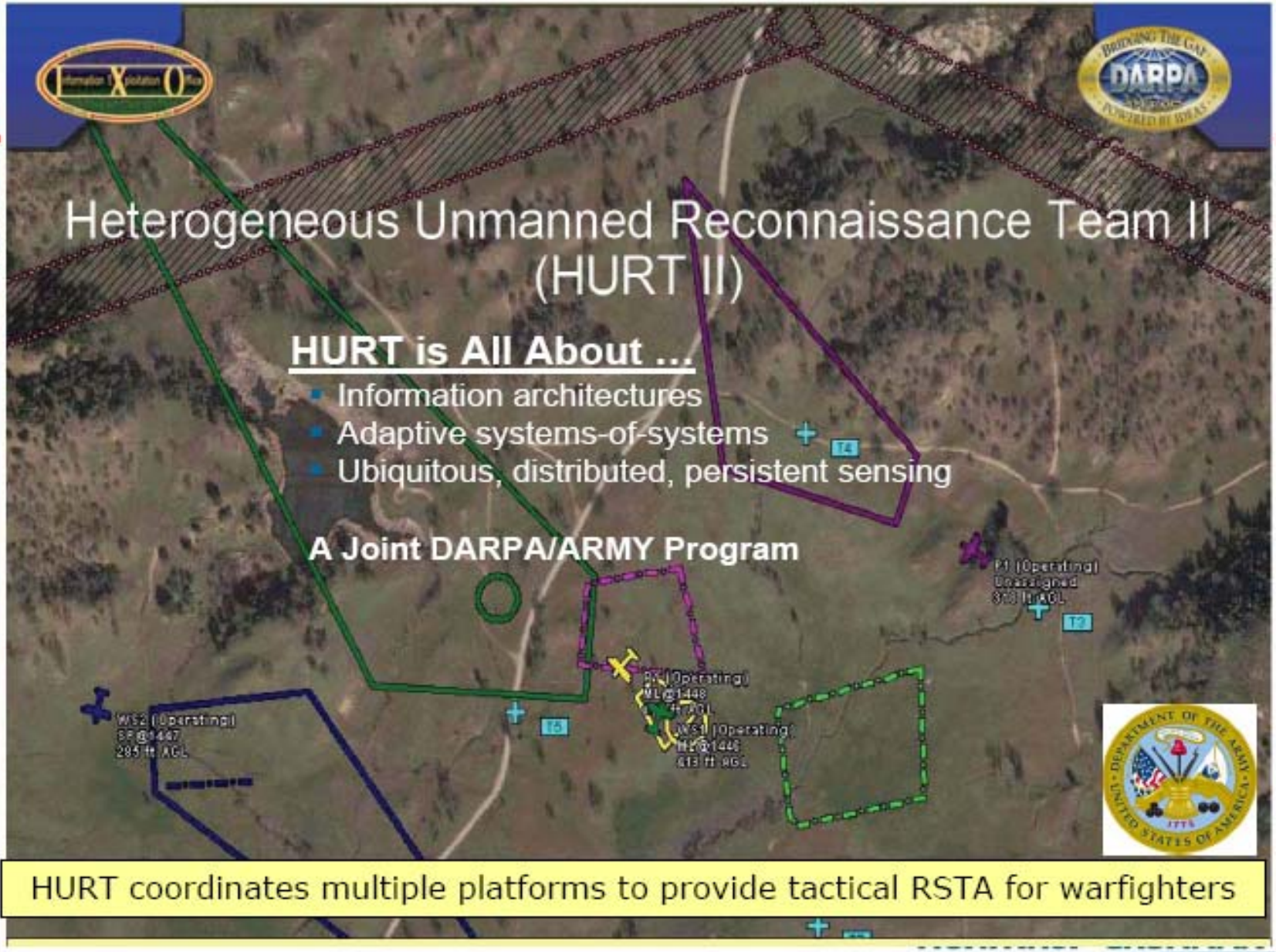

KSBY

Heterogeneous Unmanned Reconnaissance Team II (HURT II)

HURT is All About …

- Information architectures
- Adaptive systems-of-systems
- Ubiquitous, distributed, persistent sensing

A Joint DARPA/ARMY Program



HURT coordinates multiple platforms to provide tactical RSTA for warfighters

NORTHROP GRUMMAN

Integrated: Heterogeneous Unmanned Reconnaissance Team

computers

NORTHROP GRUMMAN

DEFINING THE FUTURE